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REPORTS OF THE
DIVISION OF WATER RESOURCES
EDWARD HYATT, State Engineer

BULLETIN No. 22

Volume II
of Two Volumes

DRAWINGS

ACCOMPANYING REPORT ON

SALT WATER BARRIER

Below Confluence of Sacramento and San Joaquin Rivers, California

By WALKER R. YOUNG, Engineer,
U. S. Bureau of Reclamation

Prepared under contracts executed jointly by the U. S. Bureau of Reclamation, the California Department of Public Works, and the Sacramento Valley Development Association

1929

70686

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Plate 1-1

RELIEF MAP OF CALIFORNIA

OREGON
NEVADA
PACIFIC
OCEAN
ARIZONA
MEXICO
N
E
W
S
MILES
RELIEF MAP SHOWING WATER SHEDS
AND MAIN SYSTEM STREAMS
DEPARTMENT OF PUBLIC WORKS
DIVISION OF IRRIGATION

Plate 2-1

GENERAL MAP OF BAY SYSTEM

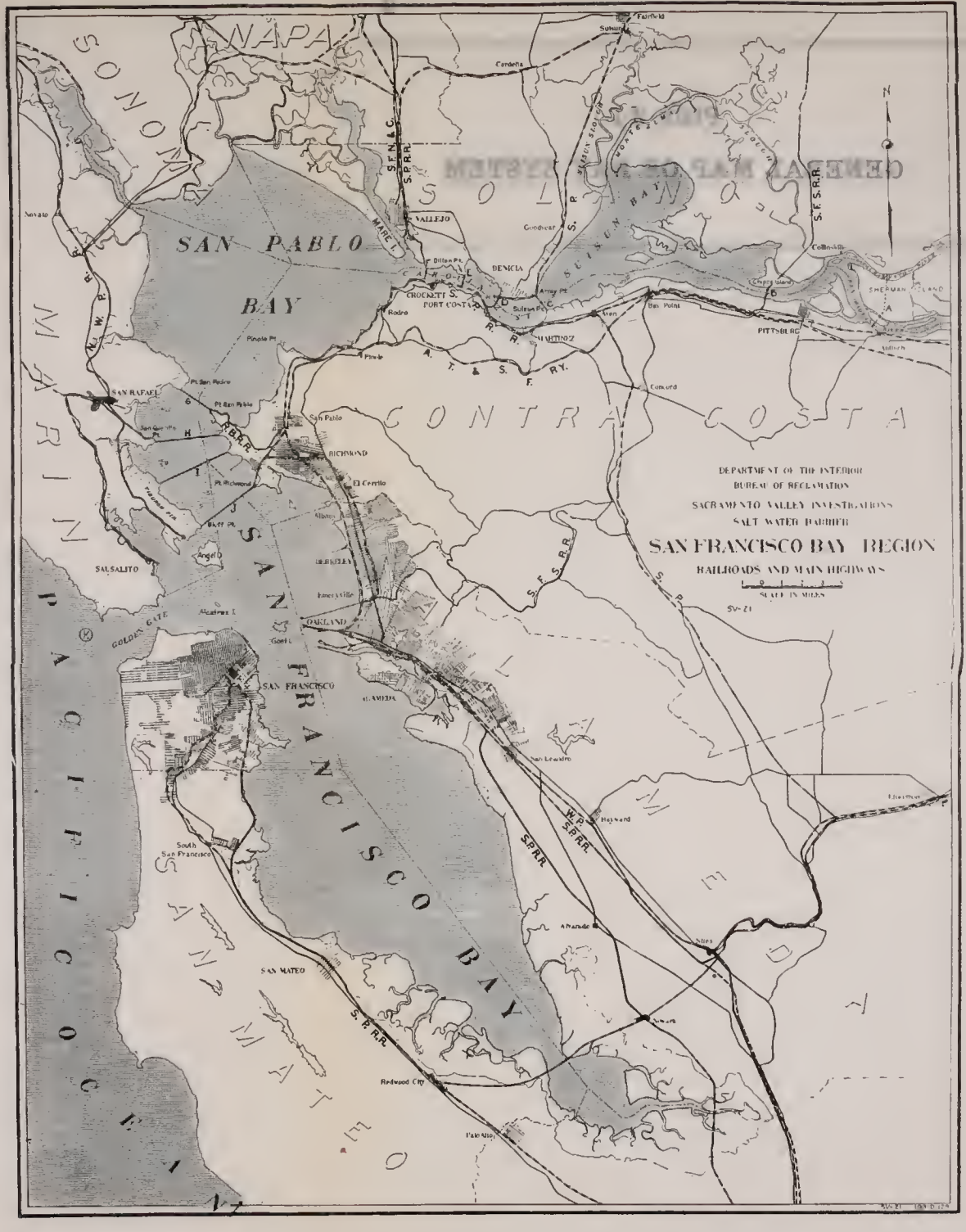

NAPA
SONOMA
SOLANO
MARIN
CONTRA COSTA
SAN PABLO BAY
SUISUN BAY
SAN FRANCISCO BAY
PACIFIC OCEAN
ALAMEDA
SAN MATEO
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS
SALT WATER BARRIER
SAN FRANCISCO BAY REGION
RAILROADS AND MAIN HIGHWAYS
SCALE IN MILES
SV-21
VALLEJO
BENICIA
CROCKETT
PORT CONTA
MARTINEZ
PITTSBURG
SAN RAFAEL
RICHMOND
El Cerrito
SALSALITO
BERKELEY
OAKLAND
ALAMEDA
SAN FRANCISCO
South San Francisco
San Leandro
Hayward
San Mateo
Redwood City
Palo Alto
Alameda
Niles
Livermore
Fairfield
Suisun
Cordelia
Vallejo
Benicia
Crockett
Martinez
Pittsburg
Concord
Sherman Island
Collinsville
Chipps Island
Bay Point
Pinole
Rodeo
Sobrante Pt.
Army Pt.
Dillon Pt.
Point San Pedro
Point Richmond
Point Pinole
Alcatraz I.
Goat I.
Yerba Buena I.
Treasure Isl.
Angel I.
Bluff Pt.
Novato
S.P.R.R.
S.F.S.R.R.
S.F.N.&C.
N.W.P.R.R.
A.T.&S.F.RY.
W.P.R.R.
GOLDEN GATE

Plate 2-2

CHART OF NORTHERN PART OF SAN FRANCISCO BAY

UNITED STATES - WEST COAST
SAN FRANCISCO ENTRANCE
CALIFORNIA
SV-145
193-D-130

Plate 2-3

CHART OF SAN PABLO BAY

CALIFORNIA
SAN PABLO BAY
CONTINUATION OF
PETALUMA CREEK
SV- 146
193-D-131

Plate 2-4

CHART OF SUISUN BAY

UNITED STATES WEST COAST
SUISUN BAY
CALIFORNIA
OE
OG
OF
OD
OC
OI
OJ
H
G
K'o
(Exact location not determined)
SIMMONS ISLAND
WHEELER ISLAND
SHERMAN I
SV-147
193-D-132

Plate 2-5

GENERAL MAP OF DELTA REGION

SOLANO
CONTRA COSTA
MAP OF
CALIFORNIA DELTA
OF THE
SACRAMENTO AND SAN JOAQUIN RIVERS

Plate 3-1

GEOLOGICAL MAP OF SAN FRANCISCO BAY REGION

Map of vicinity of San Francisco Bay showing topographic features and the geomorphic divisions resulting from the adjustment by tilting of great fault blocks

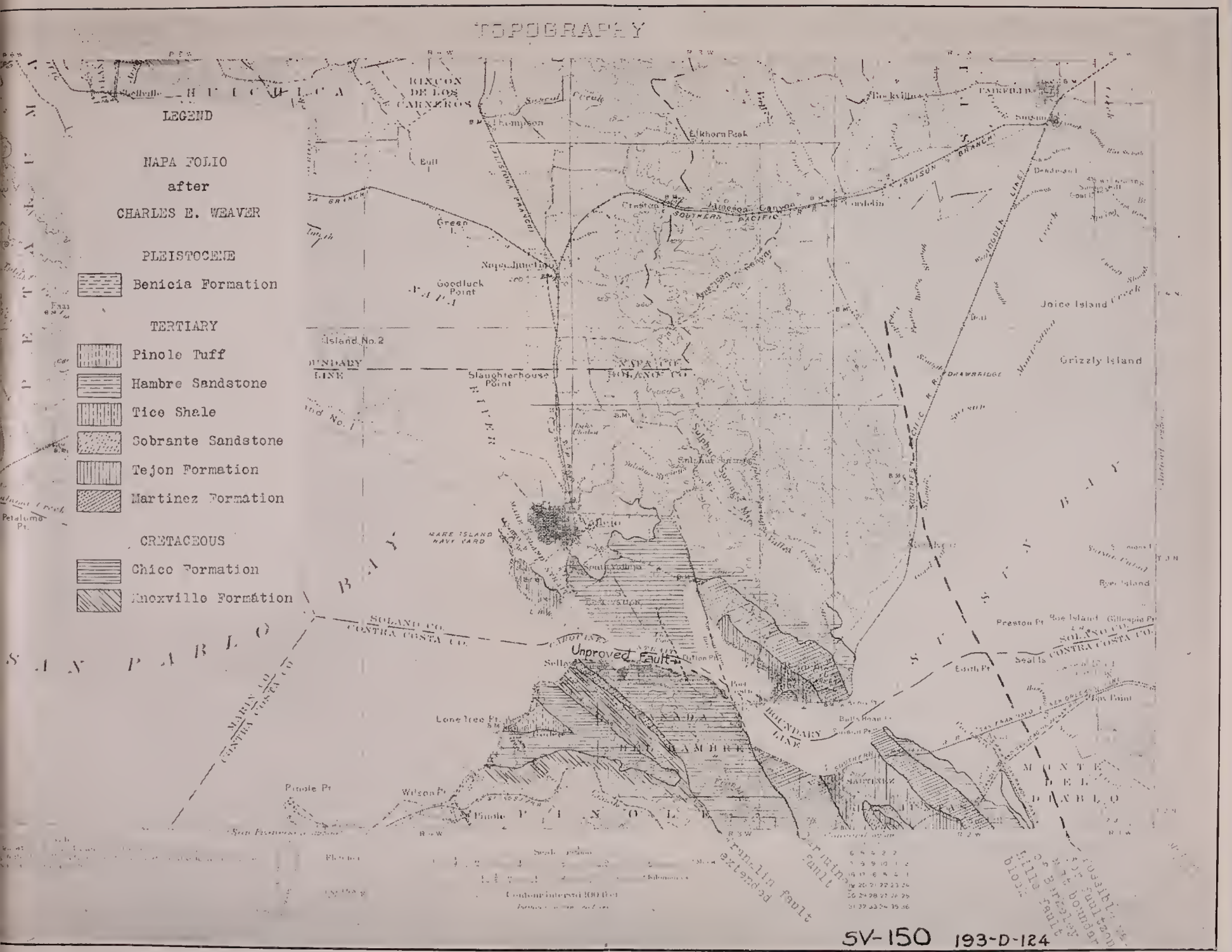
The eastern boundary of the Berkeley Hills block is not sharply defined; it may be drawn along a general zone of overthrust folding and faulting just east of the Berkeley Hills, on which the Mt Diablo thrust block has ridden westward. This thrust movement antedated the tilting of blocks to the west. The submerged bar outside the Golden Gate originated as a delta deposit of the stream that flowed in the old valley of San Francisco Bay before the land was submerged.

From Geologic Atlas of the United States - San Francisco Folio - by Andrew C. Lawson - Published by U.S. Geological Survey, Folio Nº 193. (Supplementary data has been added for this report.)

PLATE 3-1

Plate 3-2

GEOLOGICAL MAP OF CARQUINEZ STRAIT



SV-150 193-D-124

Plate 3-3

TOPOGRAPHY AND LAYOUT OF DRILLING AT ARMY POINT SITE

NOTES

Topography by Paul S. Jones Asst Engr. January 1925 for additional topography see U.S.C. & G. Chart 5534 of Suisun Bay and U.S.G.S. topographic sheets

Levels connecting the U.S.G.S. Bench Marks at the Martinez Court House (El 23.04) and on Army Point (El 5.86) using the method of double fore and back sights checked within 0.05 feet

Underwater contours shown by dash lines represent rock as developed by drilling at holes indicated. Work done in 1924-25

Thickening of holes drilled is according to distance in feet from initial points.

The approved Bulkhead and Pierhead Lines are as shown on drawing Harbor Lines for Carquinez Straits Calif U.S. Engineer Office 14th District San Francisco Calif dated Jan 10 1925

Underwater contours shown by dotted lines represent surface of mud developed by drilling supplemented by soundings given on U.S.C.&G.S. chart No 5034 dated Oct 1 1924

DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS
SALT WATER BARRIER

ARMY POINT DAMSITE

TOPOGRAPHY

DRAWN-MAH CHECKED-WBY APPROVED FOR ESTIMATING PURPOSES-

SUBMITTED- Walter Ribbing
RECOMMENDED- J.S. Savage
C.E. Mayer CHIEF ENGINEER

JUNE 1925
SV-57 193-D-9

Plate 3-4

BORINGS AT ARMY POINT SITE

Sheet 1 of 3

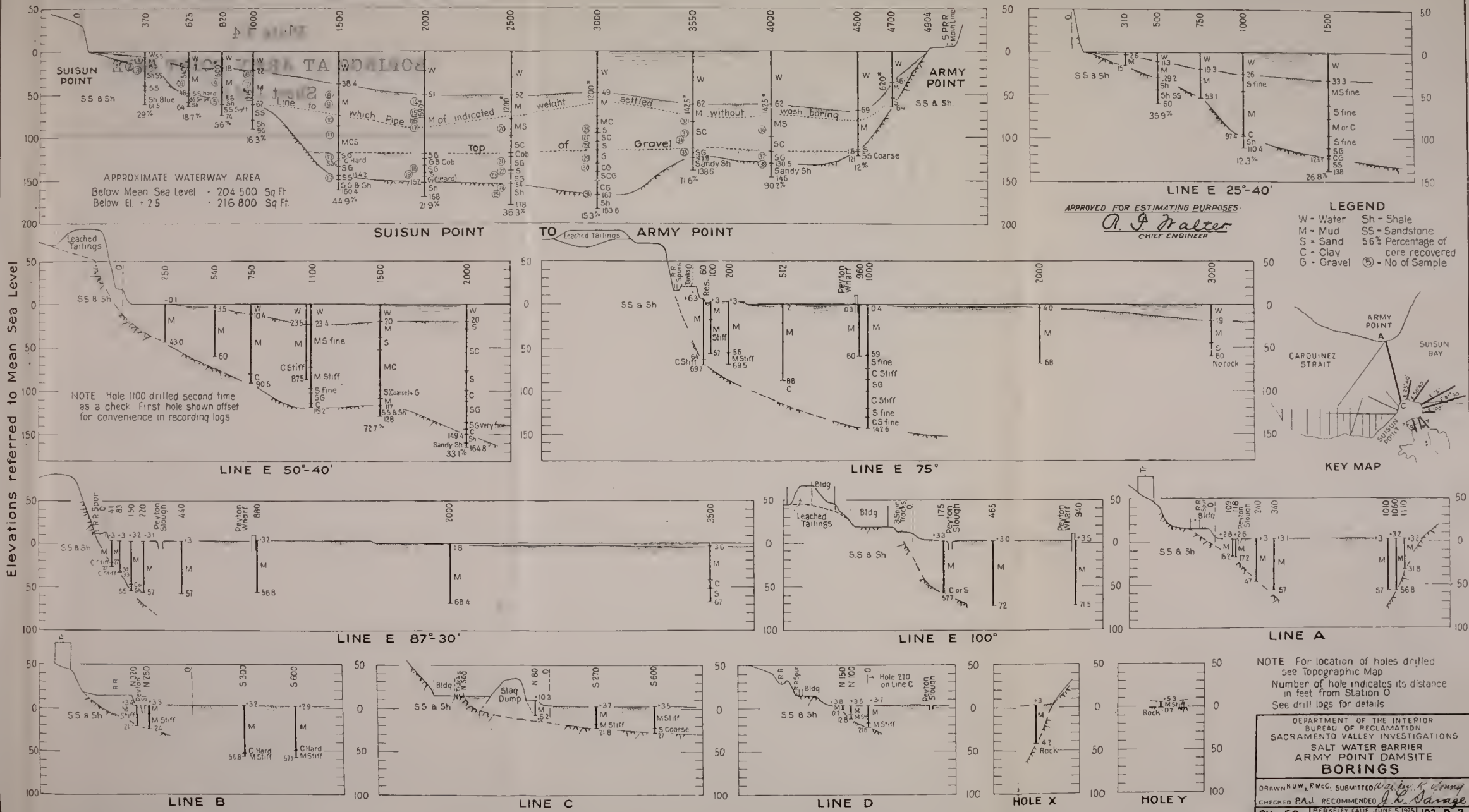
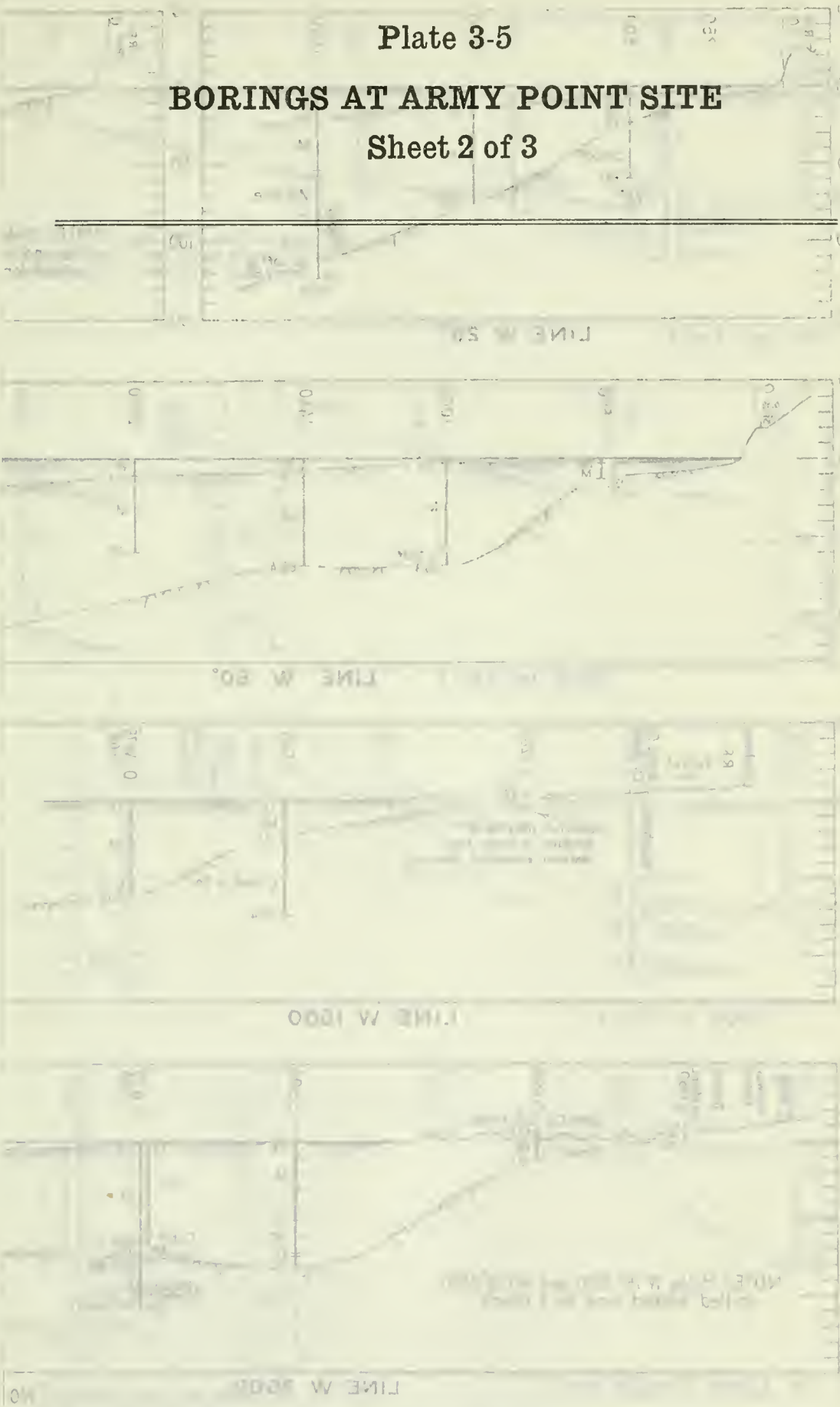
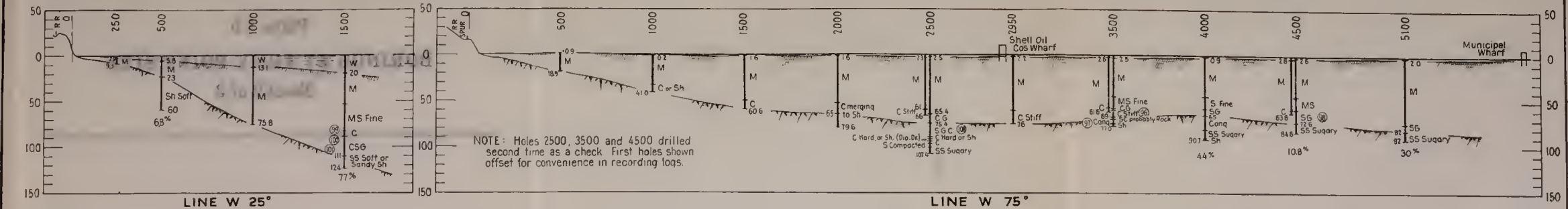

SUISUN POINT TO ARMY POINT
APPROXIMATE WATERWAY AREA
Below Mean Sea Level · 204 500 Sq Ft
Below El. +25 · 216 800 Sq Ft
Line to which Pipe M of indicated weight Settled Gravel without wash boring Top of
SS & Sh
ARMY POINT
S.P.R.R. Main Line
LINE E 25°-40'
APPROVED FOR ESTIMATING PURPOSES
A. P. Walter
CHIEF ENGINEER
LEGEND
W - Water
M - Mud
S - Sand
C - Clay
G - Gravel
Sh - Shale
SS - Sandstone
56% Percentage of core recovered
⑤ - No of Sample
Leached Tailings
NOTE Hole 1100 drilled second time as a check First hole shown offset for convenience in recording logs
LINE E 50°-40'
LINE E 75°
KEY MAP
ARMY POINT
A
CARQUINEZ STRAIT
SUISUN BAY
SUISUN POINT
Elevations referred to Mean Sea Level
LINE E 87°-30'
LINE E 100°
LINE A
LINE B
LINE C
LINE D
HOLE X
HOLE Y
NOTE For location of holes drilled see Topographic Map
Number of hole indicates its distance in feet from Station 0
See drill logs for details
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS
SALT WATER BARRIER
ARMY POINT DAMSITE
BORINGS
DRAWN H.U.W., R.McC. SUBMITTED
CHECKED P.A.J. RECOMMENDED
BERKELEY, CALIF. JUNE 5 1935
SHEET 1 OF 3
SV-50
193-D-3

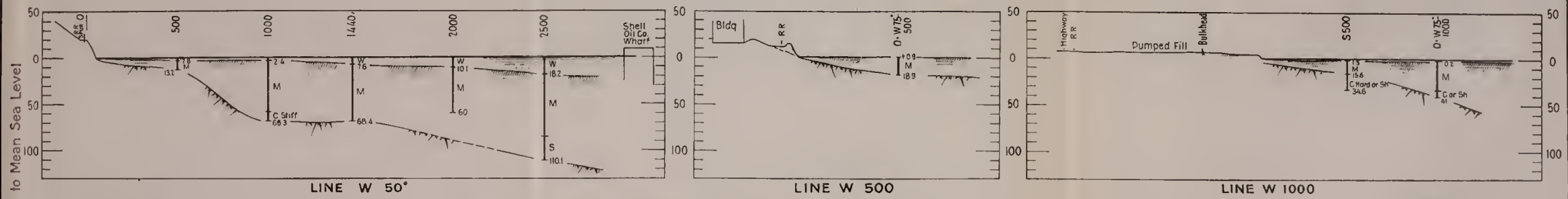
Plate 3-5

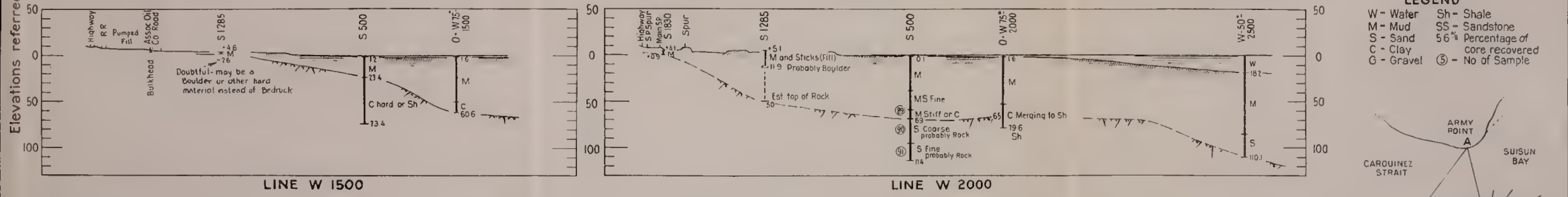
BORINGS AT ARMY POINT SITE

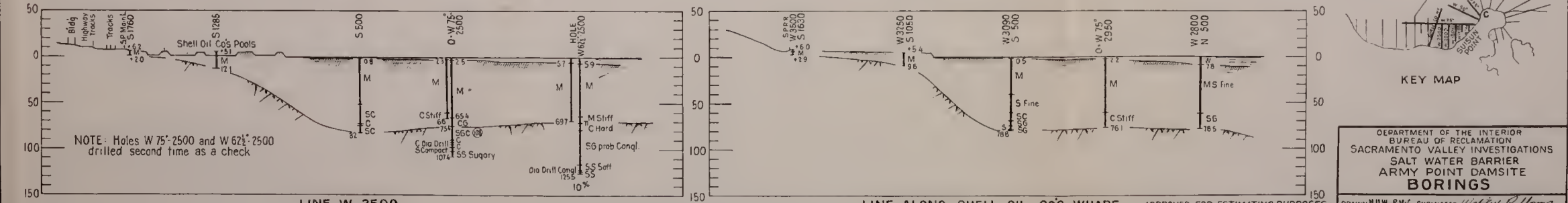
Sheet 2 of 3




LINE W 25°
LINE W 75°
NOTE: Holes 2500, 3500 and 4500 drilled second time as a check First holes shown offset for convenience in recording logs.
Shell Oil Co's Wharf
Municipal Wharf




LINE W 1500
LINE W 2000
Doubtful - may be a Boulder or other hard material instead of Bedrock
Est top of Rock
M and Sticks (Fill)

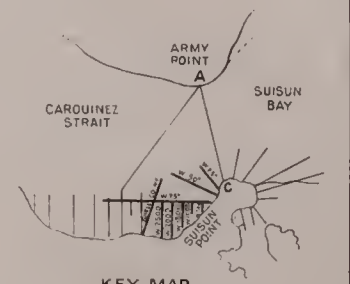

LINE W 2500
LINE ALONG SHELL OIL CO'S WHARF
NOTE: Holes W 75°-2500 and W 62½°-2500 drilled second time as a check
Shell Oil Co's Pools

NOTE: See drill logs for details.
For location of holes drilled see Topographic Map.
Number of hole indicates its distance in feet from Station 0.

APPROVED FOR ESTIMATING PURPOSES
A. P. Walter
CHIEF ENGINEER

LEGEND

W - Water Sh - Shale
M - Mud SS - Sandstone
S - Sand 56% - Percentage of core recovered
C - Clay
G - Gravel ⑤ - No of Sample



DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS
SALT WATER BARRIER
ARMY POINT DAMSITE
BORINGS

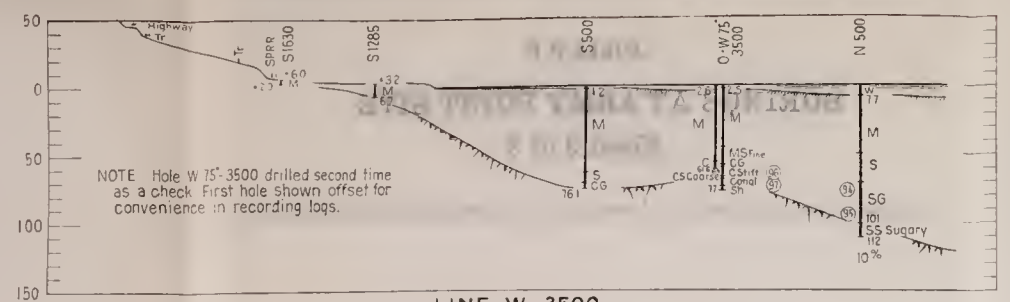
DRAWN H.U.W., R.M.C. SUBMITTED Walter R. Young
CHECKED P.A.J. RECOMMENDED J. L. Savage

SV-51	BERKELEY, CALIF. JUNE 5, 1925 SHEET 2 OF 3	193-D-4

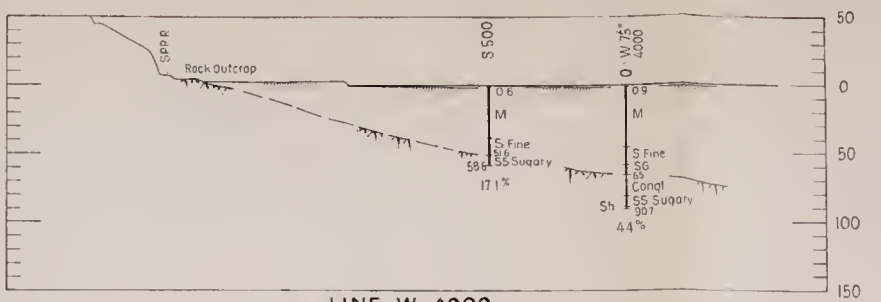
Plate 3-6

BORINGS AT ARMY POINT SITE

Sheet 3 of 3



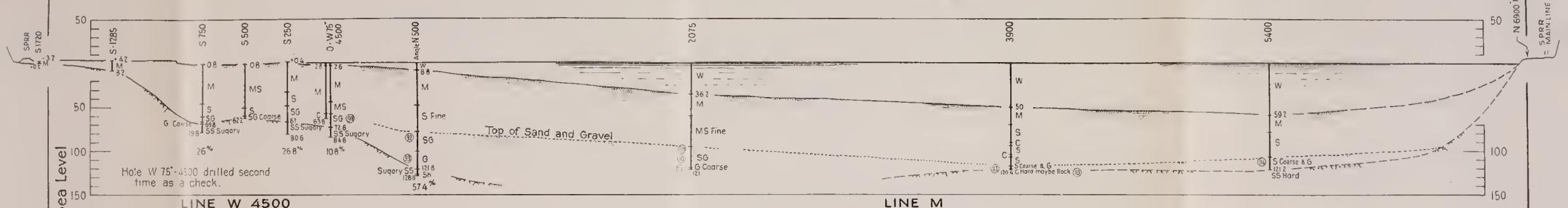
LINE W 3500



LINE W 4000

LEGEND

W - Water Sh - Shale
M - Mud SS - Sandstone
S - Sand 5.6% - Percentage of core recovered
C - Clay
G - Gravel ⑤ - No. of Sample

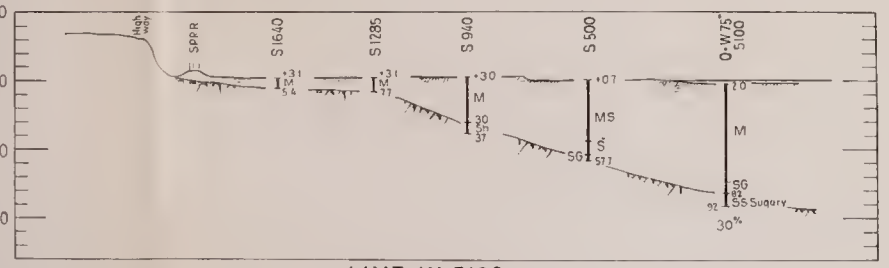


LINE W 4500

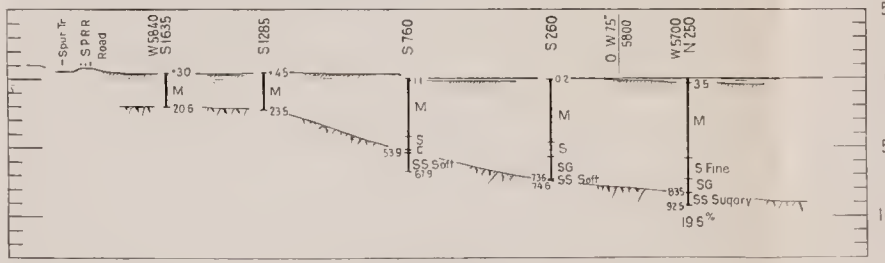
LINE M

Line M is a continuation of Line W 4500, angling about 35° Northerly at Hole N 500

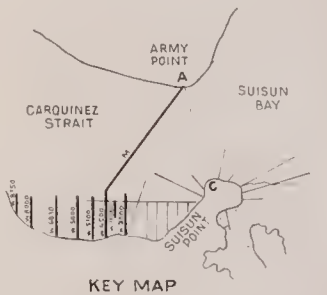
Elevations referred to Mean Sea Level



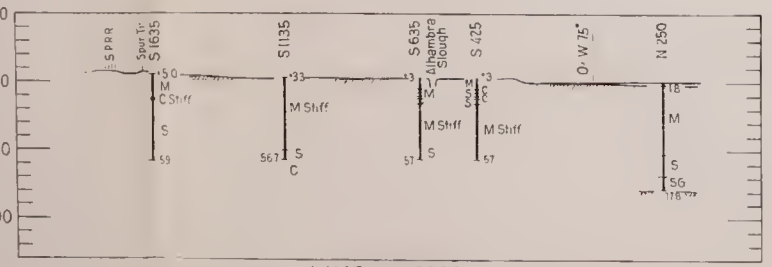
LINE W 5100



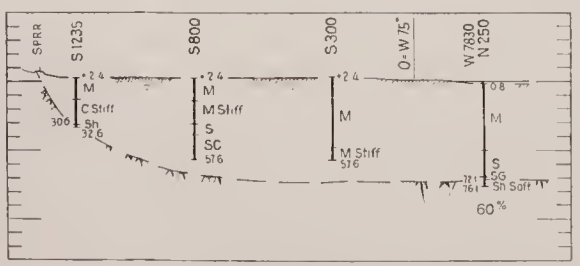
LINE W 5800



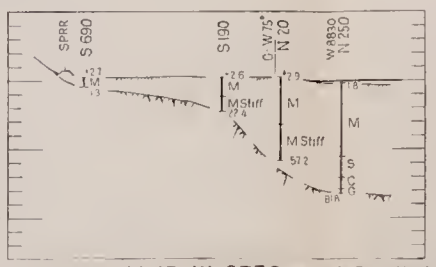
KEY MAP



LINE W 6830



LINE W 8000



LINE W 8750

NOTE For location of holes drilled see Topographic Map
Number of hole indicates its distance in feet from Station 0
See drill logs for details

APPROVED FOR ESTIMATING PURPOSES
A. F. Walter
CHIEF ENGINEER

DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS
SALT WATER BARRIER
ARMY POINT DAMSITE
BORINGS

DRAWN M.W., R.McC. SUBMITTED Wesley P. Young
CHECKED R.A.J. RECOMMENDED J. L. Savage
SV - 52 | BERKELEY CALIF JUNE 5 1925 SHEET 3 OF 3 | 193-D-5

Plate 3-7

TOPOGRAPHY AND LAYOUT OF DRILLING AT DILLON POINT SITE

DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS
SALT WATER BARRIER
DILLON POINT DAMSITE
TOPOGRAPHY
JULY 1955
DRAWN
CHECKED
RECOMMENDED
APPROVED FOR ESTIMATING PURPOSES
Southampton Bay
Tidal Flat
Glen Cove
DILLON POINT
BASE LINE
APPROVED BULKHEAD LINE
APPROVED PIERHEAD LINE
CARQUINEZ
STRAIT
Benicia
Balfour Guthrie Co
Port Costa Wharf and Warehouse Co
STEEP SIDE HILLS
S P FERRY SLIPS
Grangers Warehouse Co
Ferley Slu
Crockett
Port Costa
Scale of Feet
NOTES
JULY 1955
30-58 | 183-D-10

Plate 3-8

BORINGS AT DILLON POINT SITE

Sheet 1 of 2

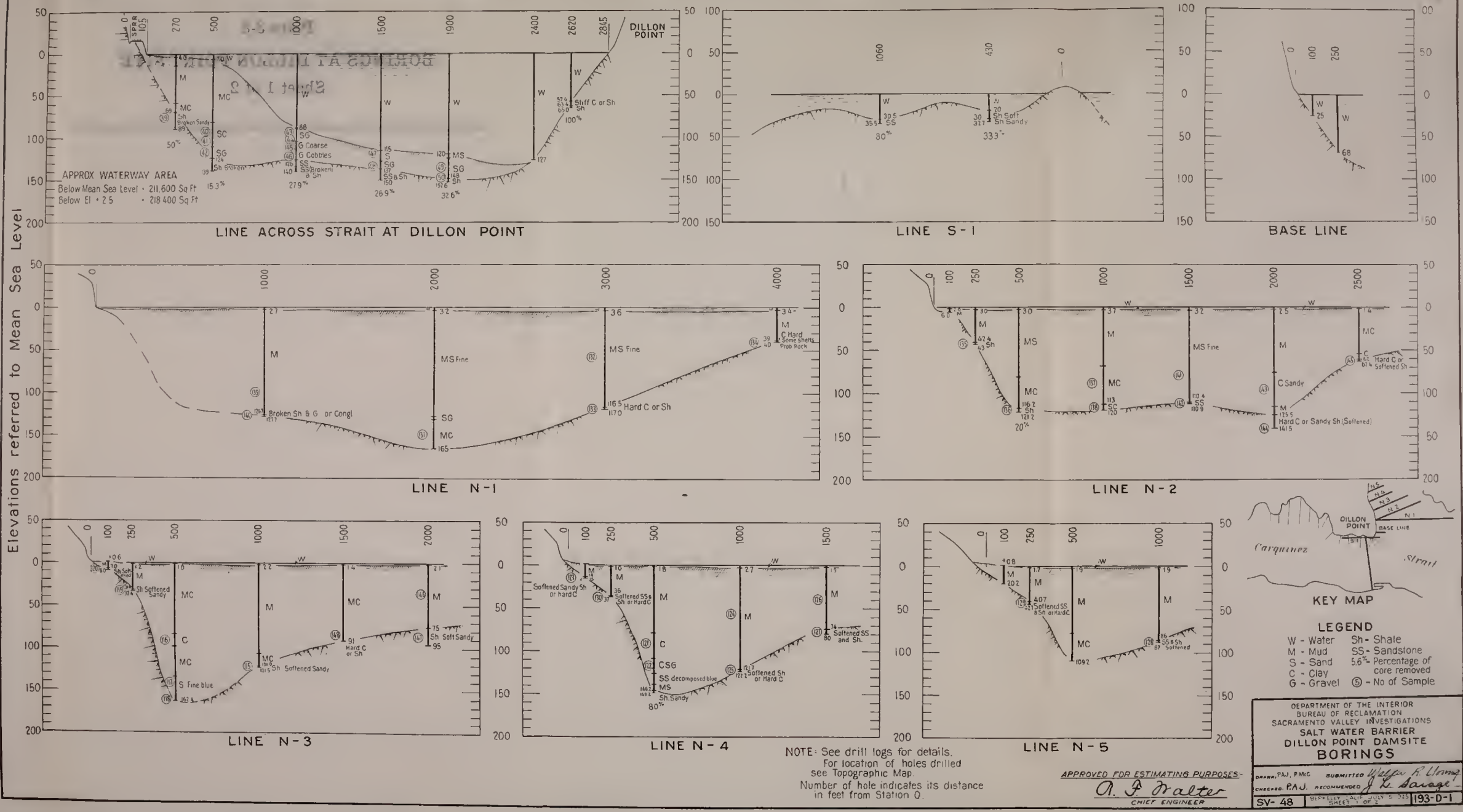
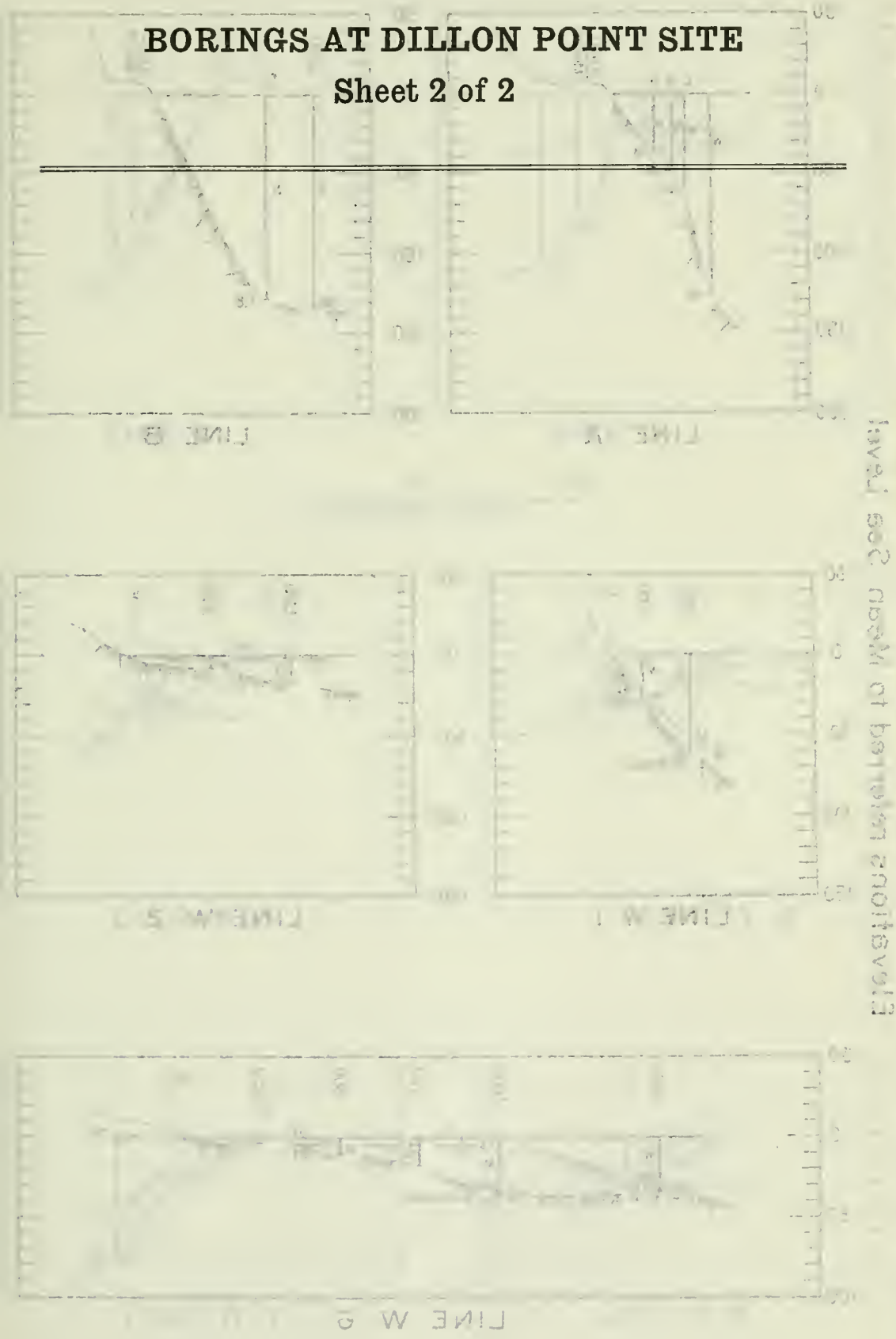
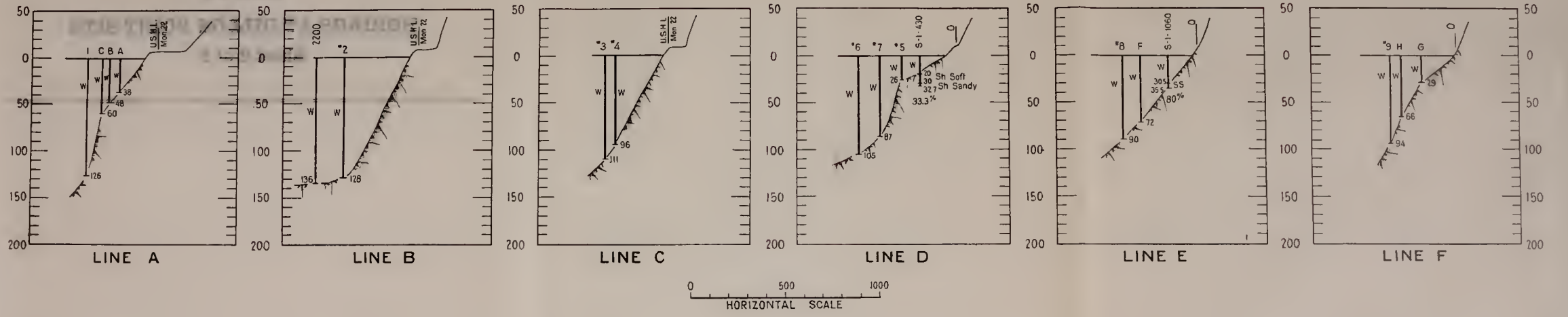

Elevations referred to Mean Sea Level
DILLON POINT
APPROX WATERWAY AREA
Below Mean Sea Level • 211,600 Sq Ft
Below El • 2.5 • 218,400 Sq Ft
LINE ACROSS STRAIT AT DILLON POINT
LINE S-1
BASE LINE
LINE N-1
LINE N-2
LINE N-3
LINE N-4
LINE N-5
KEY MAP
Carquinez
Strait
LEGEND
W - Water
M - Mud
S - Sand
C - Clay
G - Gravel
Sh - Shale
SS - Sandstone
5.6% - Percentage of core removed
(5) - No of Sample
NOTE: See drill logs for details.
For location of holes drilled see Topographic Map.
Number of hole indicates its distance in feet from Station 0.
APPROVED FOR ESTIMATING PURPOSES
A. P. Walter
CHIEF ENGINEER
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS
SALT WATER BARRIER
DILLON POINT DAMSITE
BORINGS
DRAWN: P.A.J., P. McC
CHECKED: P.A.J.
SUBMITTED: Walter P. Young
RECOMMENDED: J. L. Savage
SV-48
BERKELEY, CALIF. JULY 5 1935
SHEET 1 OF 2
193-D-1

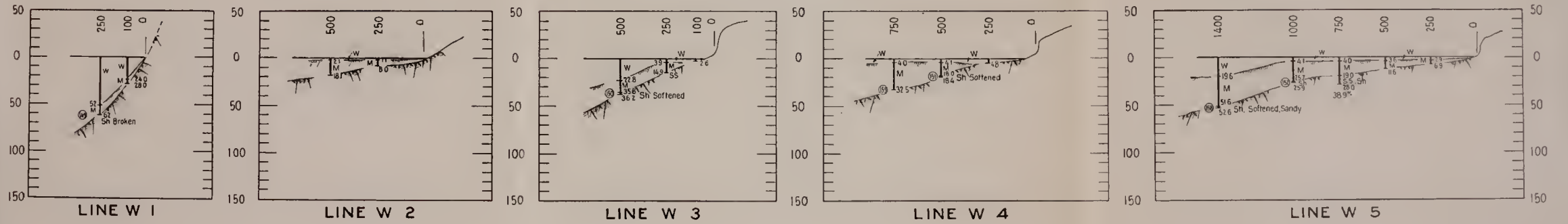
Plate 3-9

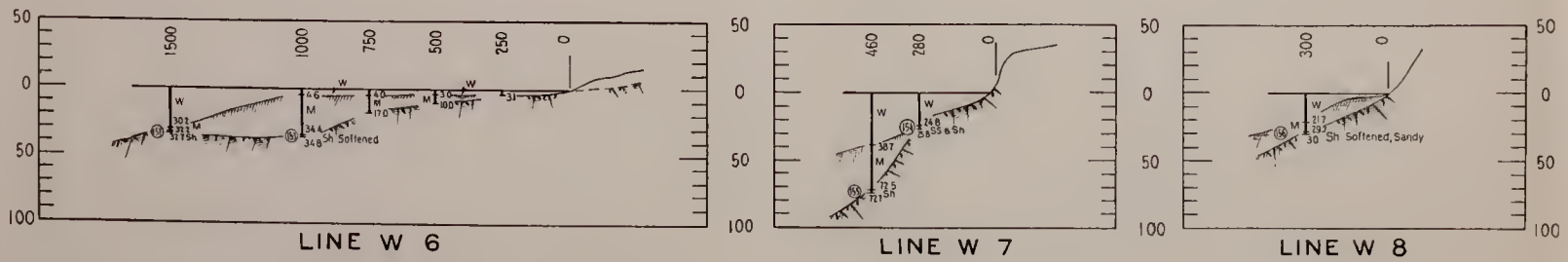
BORINGS AT DILLON POINT SITE

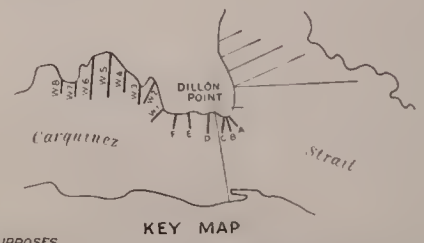
Sheet 2 of 2











LEGEND

W - Water	Sh. - Shale
M - Mud	SS - Sandstone
S - Sand	56% - Percentage of core removed
C - Clay	⑤ - No. of Sample
G - Gravel	

APPROVED FOR ESTIMATING PURPOSES

A. F. Walter
CHIEF ENGINEER

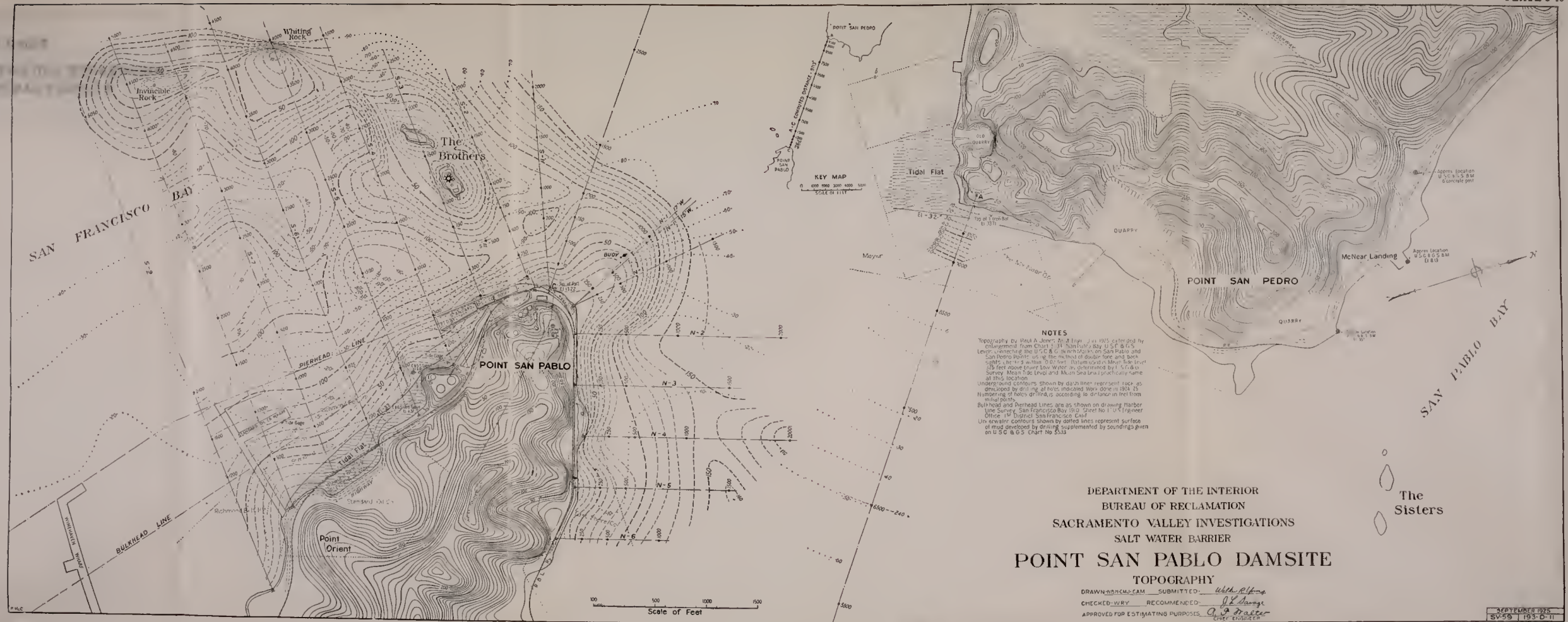
NOTE - For location of holes drilled see Topographic Map
Number of hole indicates its distance in feet from Station 0
See drill logs for details

DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS
SALT WATER BARRIER
DILLON POINT DAMSITE
BORINGS

DRAWN P.A.J., R.McC., SUBMITTED *Walter F. Lyman*
CHECKED P.A.J. RECOMMENDED *J. L. Savage*
SV-49 BERKELEY, CALIF. JULY 15 1925 SHEET 2 OF 2 193-D-2

Plate 3-10

TOPOGRAPHY AND LAYOUT OF DRILLING AT POINT SAN PABLO SITE


Whiting Rock
Invincible Rock
The Brothers
SAN FRANCISCO BAY
POINT SAN PABLO
PIERHEAD LINE
BULKHEAD LINE
Tidal Flat
Point Orient
Richmond Inner Harbor
Stanford Oil Co
Scale of Feet
100 500 1000 1500
POINT SAN PEDRO
KEY MAP
SCALE OF FEET
Tidal Flat
QUARRY
McNear Landing
POINT SAN PEDRO
SAN PABLO BAY
The Sisters
N
NOTES
Topography By Paul A Jones Jr Jr Engr June 1925 extended by enlargement from Chart 1214 San Francisco Bay U S C & G S
Levels connecting the U S C & G Bench Marks on San Pablo and San Pedro Points using the method of double fore and back sights, checked within 0.01 feet. Datum reads Mean Tide level 3.25 feet above Lower Low Water as determined by U S C & G Survey. Mean Tide Level and Mean Sea Level practically same at this location.
Underground contours shown by dash lines represent rock as developed by drilling all holes indicated Work done in 1924 25
Numbering of holes drilled is according to distance in feet from initial points.
Bulkhead and Pierhead Lines are as shown on drawing Harbor Line Survey San Francisco Bay 1910 Sheet No 1 U S Engineer Office 1st District San Francisco Calif
Underwater contours shown by dotted lines represent surface of mud developed by drilling supplemented by soundings given on U S C & G S Chart No 5533

DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS
SALT WATER BARRIER

POINT SAN PABLO DAMSITE

TOPOGRAPHY

DRAWN-NORCM-CAM SUBMITTED: Wm R Young
CHECKED-WRY RECOMMENDED: J L Savage
APPROVED FOR ESTIMATING PURPOSES: A P Matter
CHIEF ENGINEER

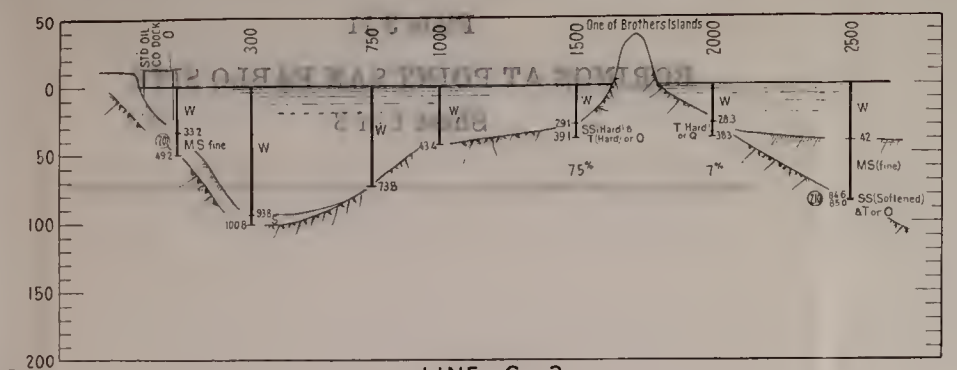
SEPTEMBER 1925
SV-59 | 193-D-11

Plate 3-11

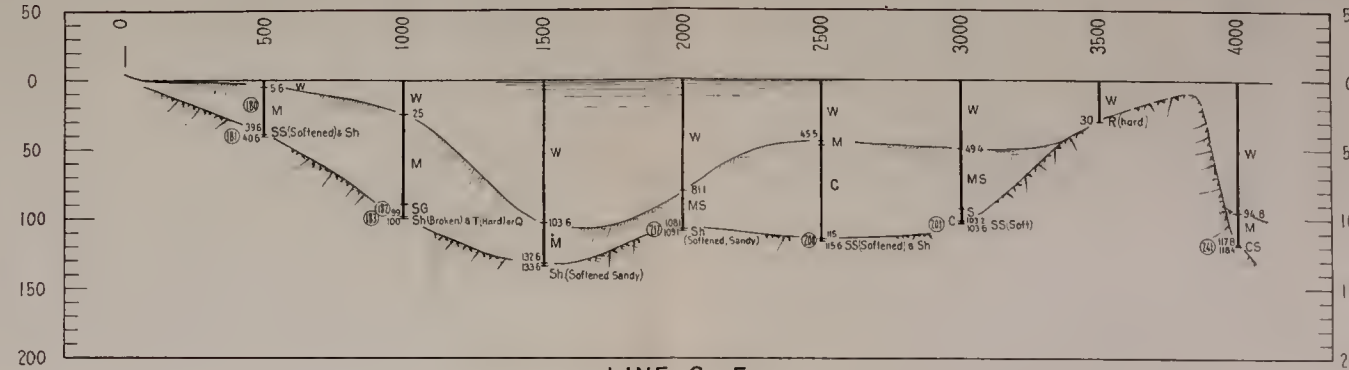
BORINGS AT POINT SAN PABLO SITE

Sheet 1 of 3

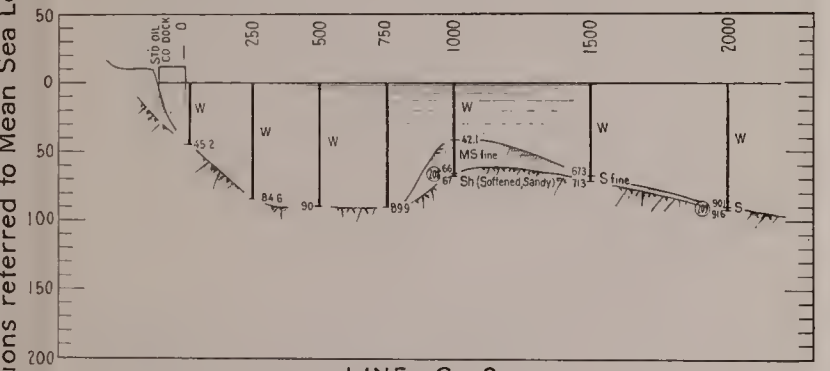
Elevations referred to Mean Sea Level



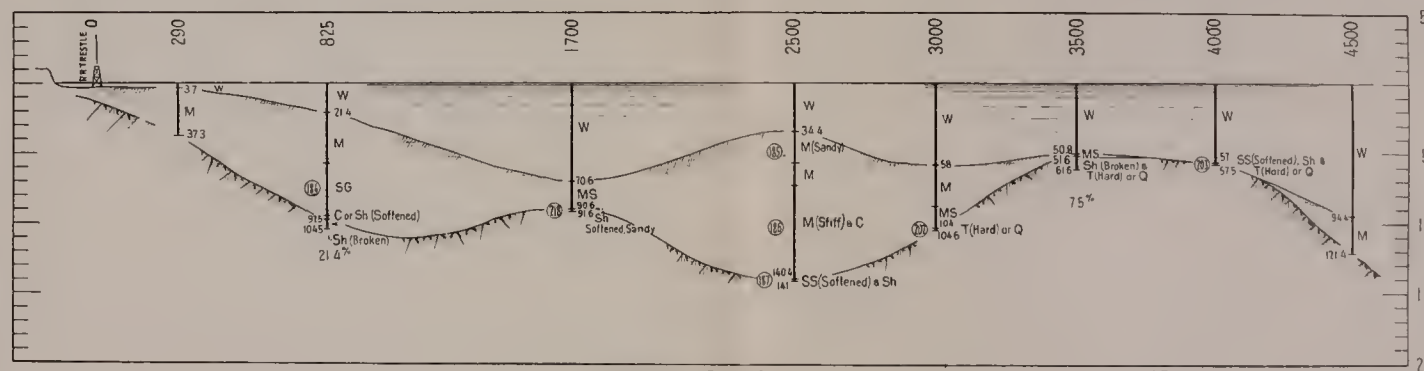
LINE S-3



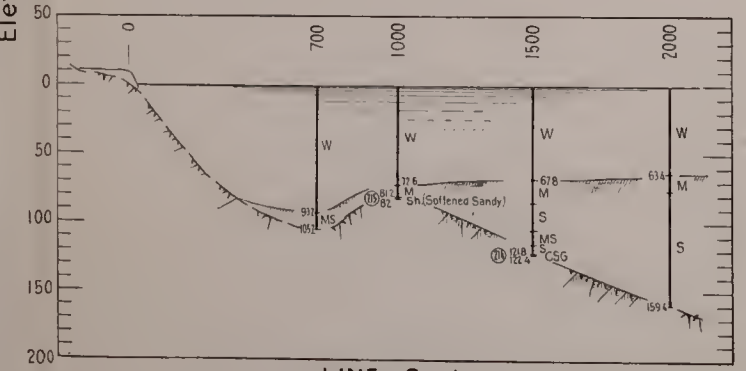
LINE S-5



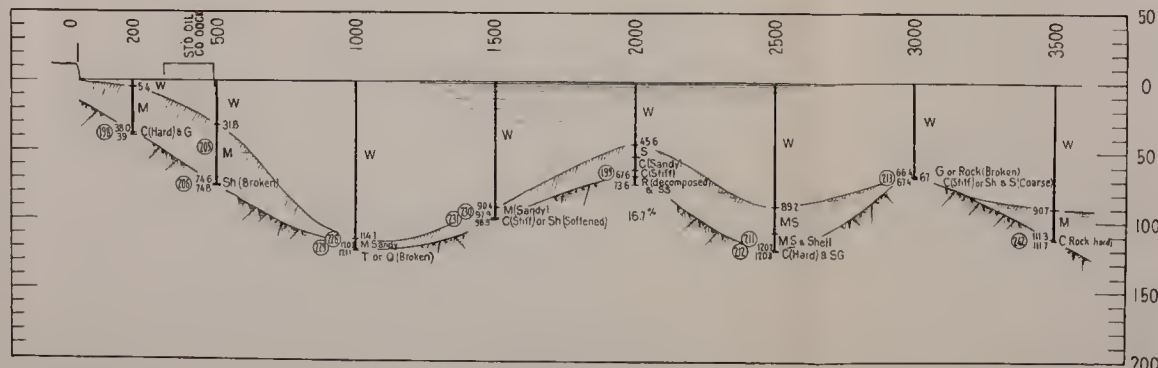
LINE S-2



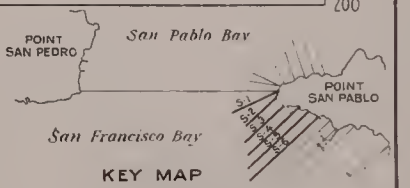
LINE S-6



LINE S-1



LINE S-4



KEY MAP

LEGEND

W - Water	T - Traprock
M - Mud	Q - Quartzite
S - Sand	R - Rock
C - Clay	56% - Percentage of core recovered
G - Gravel	⑤ - No of Sample
Sh - Shale	
SS - Sandstone	

NOTE
For location of holes drilled see Topographic Map.
Number of hole indicates its distance in feet from Station 0.
See drill logs for details.

APPROVED FOR ESTIMATING PURPOSES
A. P. Walter
CHIEF ENGINEER

DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS
SALT WATER BARRIER
POINT SAN PABLO DAMSITE
BORINGS

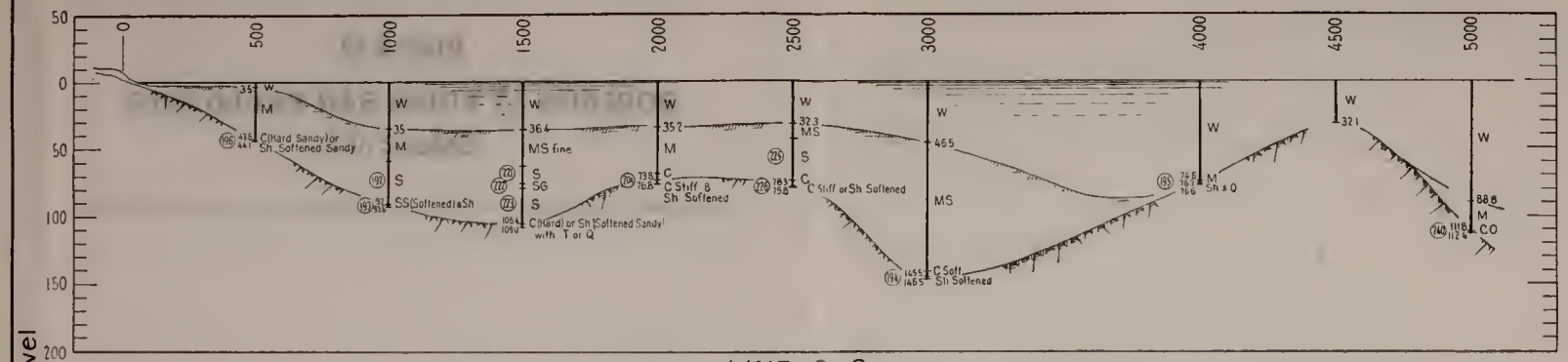
DRAWN P.A.J., R.McC. SUBMITTED Walter P. Young
CHECKED P.A.J. RECOMMENDED J. L. Savage

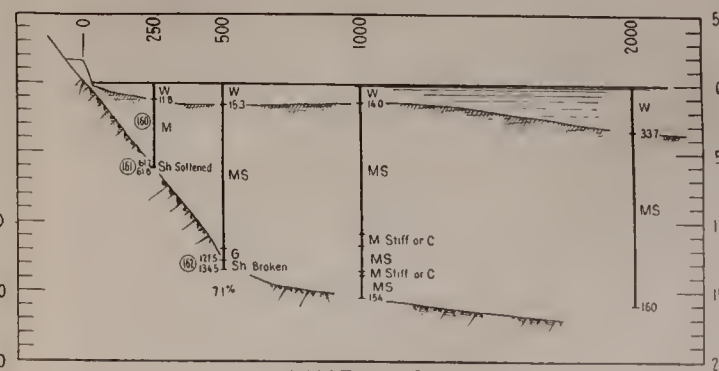
SV-53 | BERKELEY, CALIF. SEPT. 1, 1935 SHEET 1 OF 3 | 193-D-6

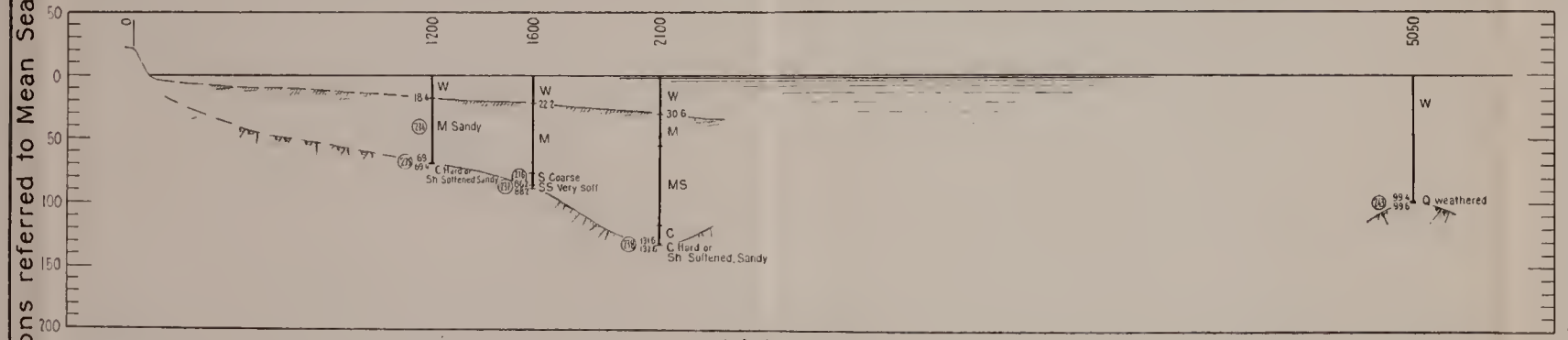
Plate 3-12

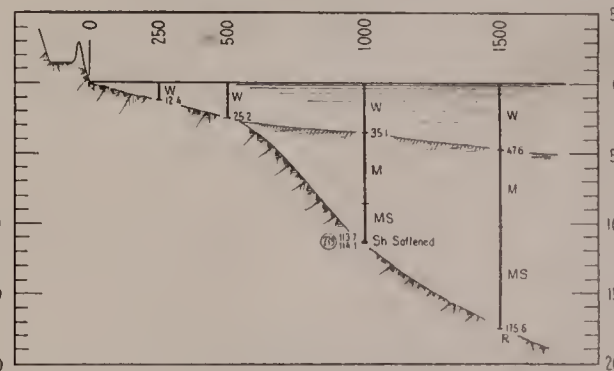
BORINGS AT POINT SAN PABLO SITE

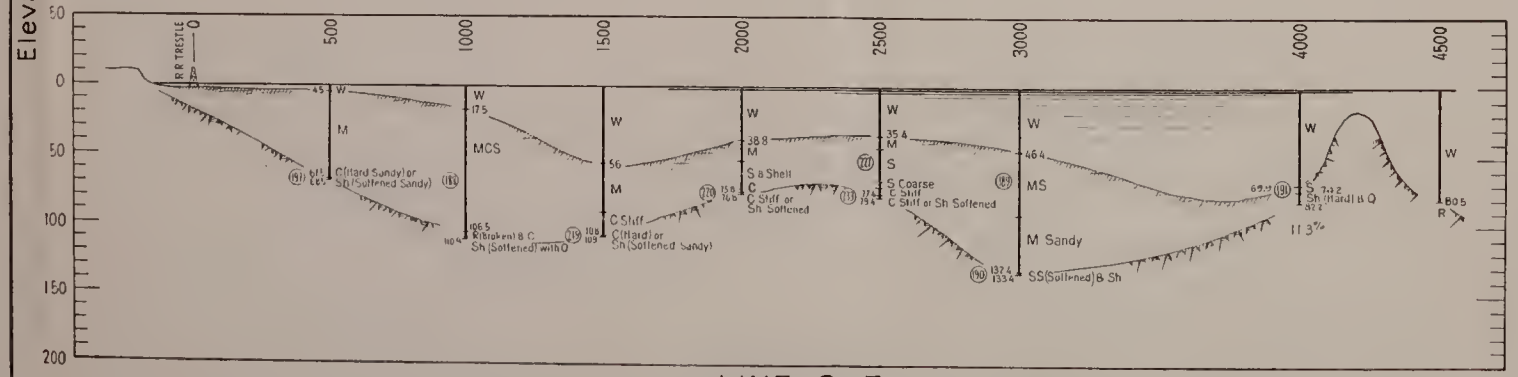
Sheet 2 of 3

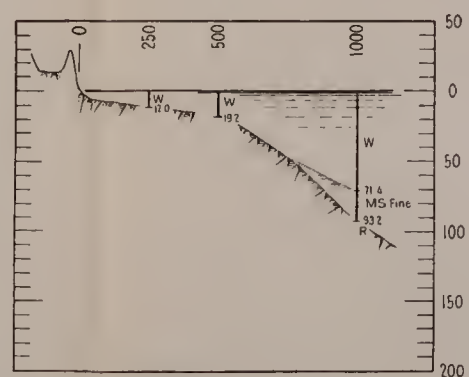








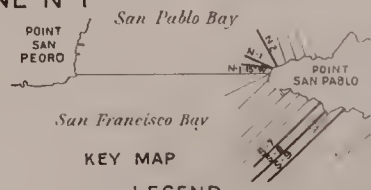




Hole 1000 is located on Line N-1 17°W

APPROVED FOR ESTIMATING PURPOSES

A. P. Walter
CHIEF ENGINEER



LEGEND

W - Water	T - Traprock
M - Mud	Q - Quartzite
S - Sand	R - Rock
C - Clay	56% - Percentage of core recovered
G - Gravel	(5) - No of Sample
Sh - Shale	
SS - Sandstone	

NOTE
For location of holes drilled see Topographic Map.
Number of hole indicates its distance in feet from Station 0.
See drill logs for details.

DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS
SALT WATER BARRIER
POINT SAN PABLO DAMSITE
BORINGS

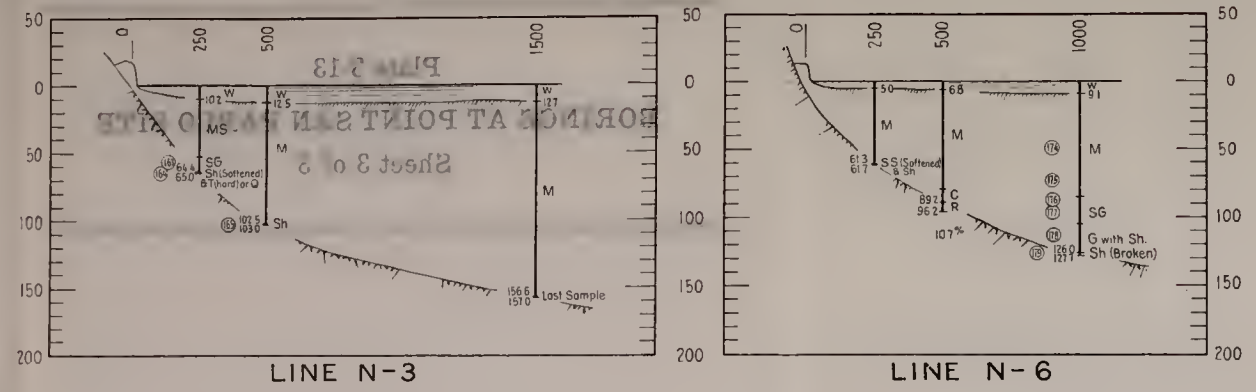
DRAWN P.A.J., R.M.C. SUBMITTED Walter P. Young
CHECKED P.A.J. RECOMMENDED J. L. Savage

SV-54 | BERKELEY, CALIF. SEPT. 1, 1925 SHEET 2 OF 3 | 193-D-7

Plate 3-13

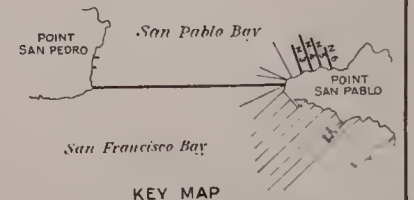
BORINGS AT POINT SAN PABLO SITE

Sheet 3 of 3


LINE N-3
LINE N-6
Elevations referred to Mean Sea Level
Line to which pipe of indicated weight settled
Top of Medium to Coarse Sand
Top of Gravel
without wash boring
APPROXIMATE WATERWAY AREA
Below Mean Sea Level = 489,000 Sq Ft
Below El. +2.5 = 513,000 Sq Ft.
NOTE: Holes 3500 and 6500, drilled second time to develop bedrock. Second holes shown offset for convenience in recording logs.
POINT SAN PABLO TO POINT SAN PEDRO
LINE N-4
LINE N-5

LEGEND

W - Water	T - Traprock
M - Mud	Q - Quartzite
S - Sand	R - Rock
C - Clay	56% - Percentage of core recovered
G - Gravel	⑤ - No of Sample
Sh - Shale	
SS - Sandstone	



APPROVED FOR ESTIMATING PURPOSES
A. P. Walter
CHIEF ENGINEER

NOTE: For location of holes drilled see Topographic Map.
Number of hole indicates its distance in feet from Station 0.
See drill logs for details

DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS
SALT WATER BARRIER
POINT SAN PABLO DAMSITE
BORINGS

DRAWN: P.A.J., R.M.C. SUBMITTED: Walter P. Young
CHECKED: P.A.J. RECOMMENDED: J. L. Savage
SV-55 | BERKELEY, CALIF. SEPT. 1935 SHEET 3 OF 3 | 193-D-8

Plate 3-14

LAYOUT AT BENICIA SITE

(Foundations assumed)

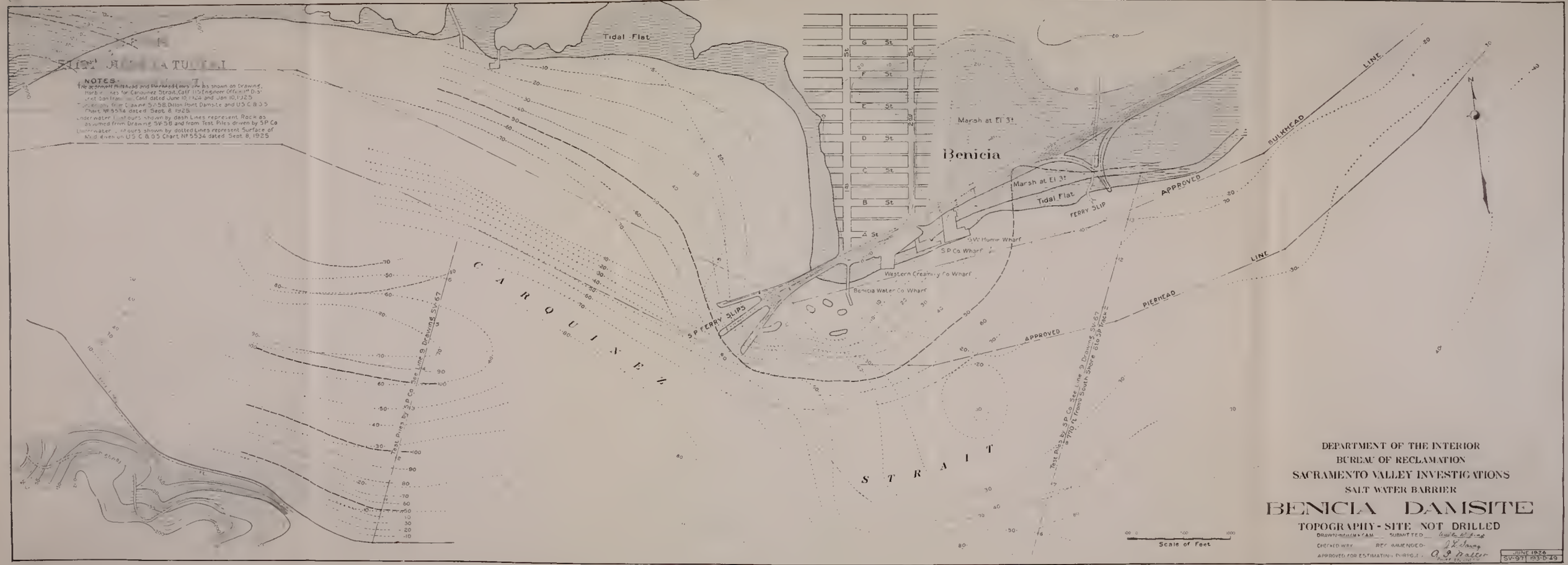
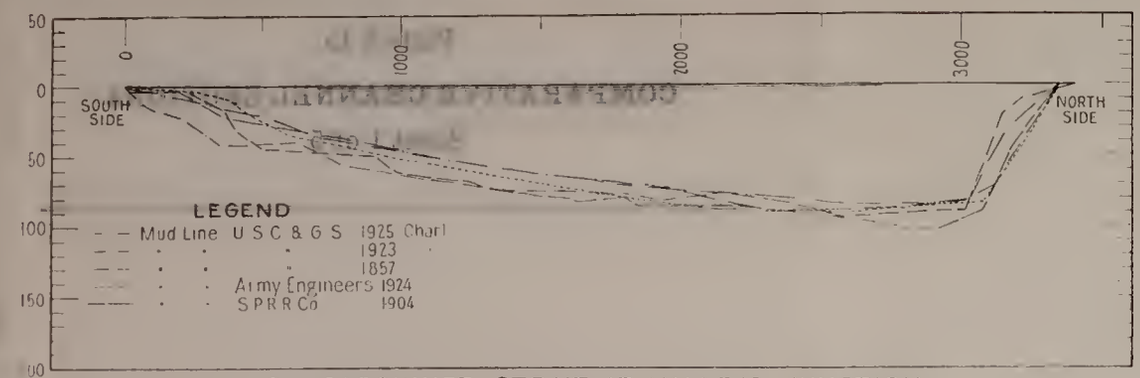

NOTES:
The pierhead, bulkhead and harbor lines shown on this drawing, Harbor Lines for Carquinez Strait, Calif. U.S. Engineer Office 1st Dist. San Francisco, Calif. dated June 10, 1924 and Jan 10, 1925 Topography from Coast & G.S. T-5B, Dillon Point Damsite and U.S.C.& G.S. Chart, No 5534 dated Sept. 8, 1925.
Underwater contours shown by dash Lines represent Rock as assumed from Drawing SV-58 and from Test Piles driven by S.P. Co
Underwater contours shown by dotted Lines represent Surface of Mud given on U.S.C.& G.S. Chart No 5534 dated Sept. 8, 1925
Tidal Flat
Benicia
Marsh at El 3±
Tidal Flat
G St
F St
E St
D St
C St
B St
A St
5th St
3rd St
Marsh at El 3±
FERRY SLIP
W. Humr Wharf
S.P. Co Wharf
Western Creamery Co Wharf
Benicia Water Co Wharf
S.P. FERRY SLIPS
BULKHEAD LINE
APPROVED
PIERHEAD LINE
APPROVED
CARQUINEZ
STRAIT
Test Piles by S.P. Co See Line 9 Drawing SV-67
Test Piles by S.P. Co See Line 9 Drawing SV-67 a 7710 ft from South Shore Elo 53 Track 2
N
Scale of Feet
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS
SALT WATER BARRIER
BENICIA DAMSITE
TOPOGRAPHY - SITE NOT DRILLED
DRAWN-TRACED-CAM
SUBMITTED
CHECKED WRK
RECOMMENDED
APPROVED FOR ESTIMATING PURPOSES
JUNE 1926
SV-97 193-D-49

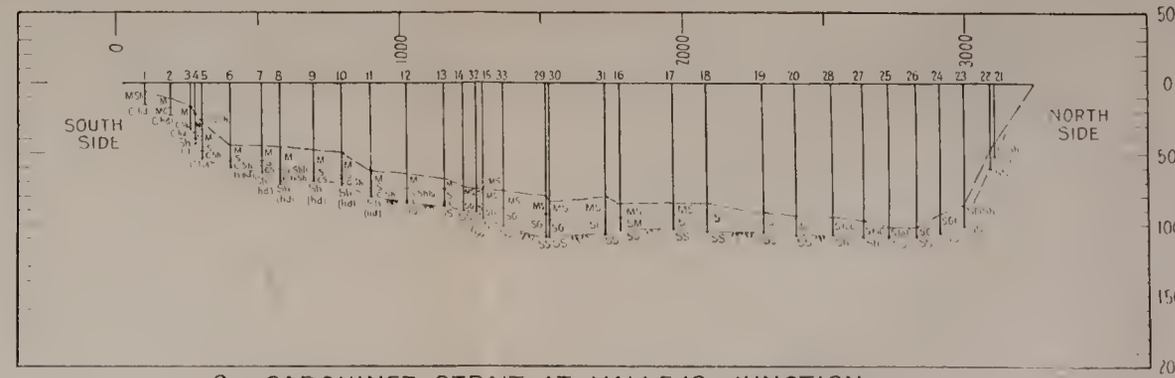
Plate 3-15

COMPARATIVE CHANNEL SECTIONS

Sheet 1 of 5

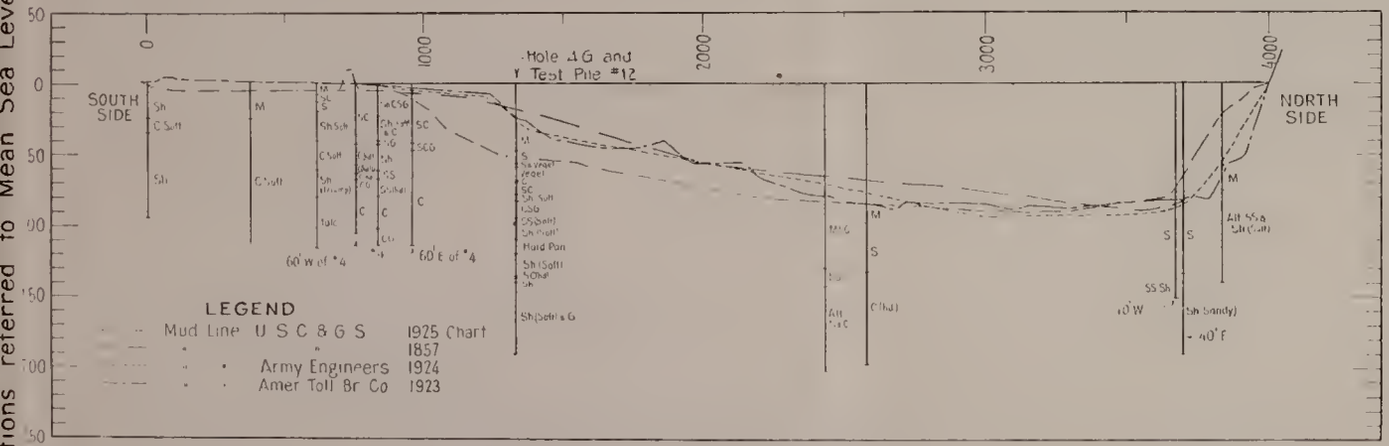


2 CARQUINEZ STRAIT AT VALLEJO JUNCTION

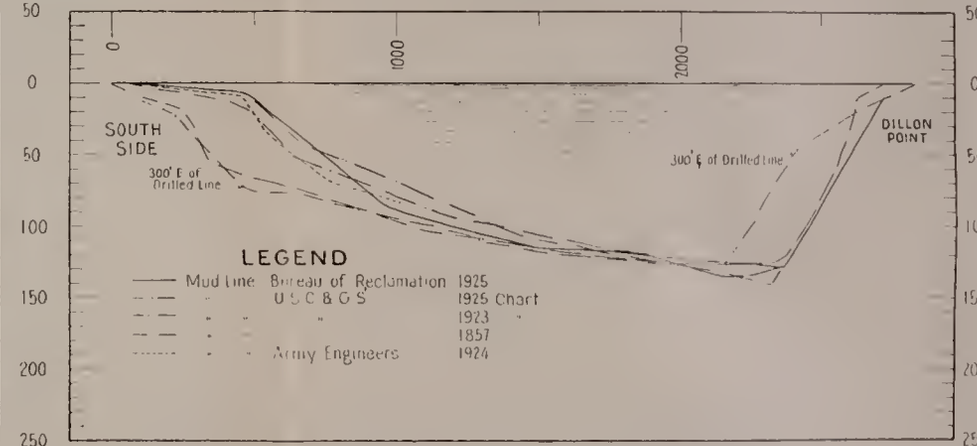


3 CARQUINEZ STRAIT AT VALLEJO JUNCTION
Drilled by Southern Pacific Company

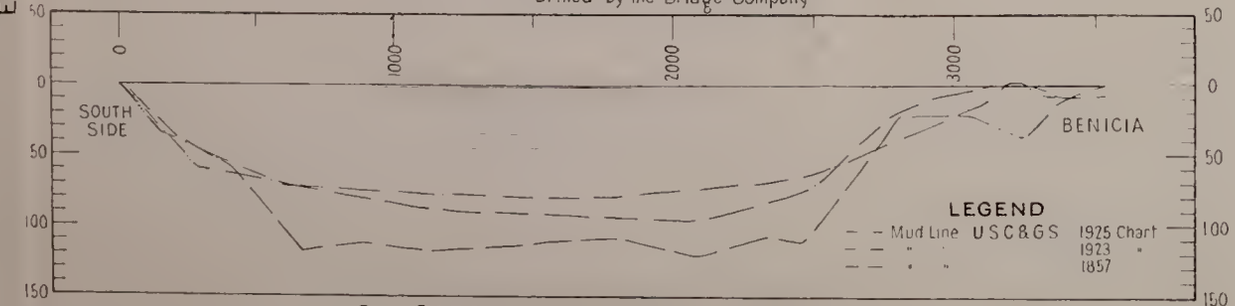
Elevations referred to Mean Sea Level


Hole 4G and Test Pile #12
SOUTH SIDE
NORTH SIDE
60' W of #4
60' E of #4
LEGEND
Mud Line U S C & G S 1925 Chart
" 1857 "
Army Engineers 1924
Amer Toll Br Co 1923

4 CARQUINEZ STRAIT AT VALONA
American Toll Bridge Site
Drilled by the Bridge Company


SOUTH SIDE
DILLON POINT
300' E of Drilled Line
LEGEND
Mud Line Bureau of Reclamation 1925
" U S C & G S 1925 Chart
" " 1923 "
" " 1857 "
Army Engineers 1924

5 CARQUINEZ STRAIT AT DILLON POINT
(See Drawings SV-48 and SV-58)



6 CARQUINEZ STRAIT AT BENICIA

LEGEND

M = Mud	Sh = Shale
S = Sand	SS = Sandstone
C = Clay	L = Loam
G = Gravel	

APPROVED FOR ESTIMATING PURPOSES
A. F. Walter
CHIEF ENGINEER

DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS
SALT WATER BARRIER
COMPARATIVE CHANNEL SECTIONS
SAN PABLO AND SUISUN BAYS

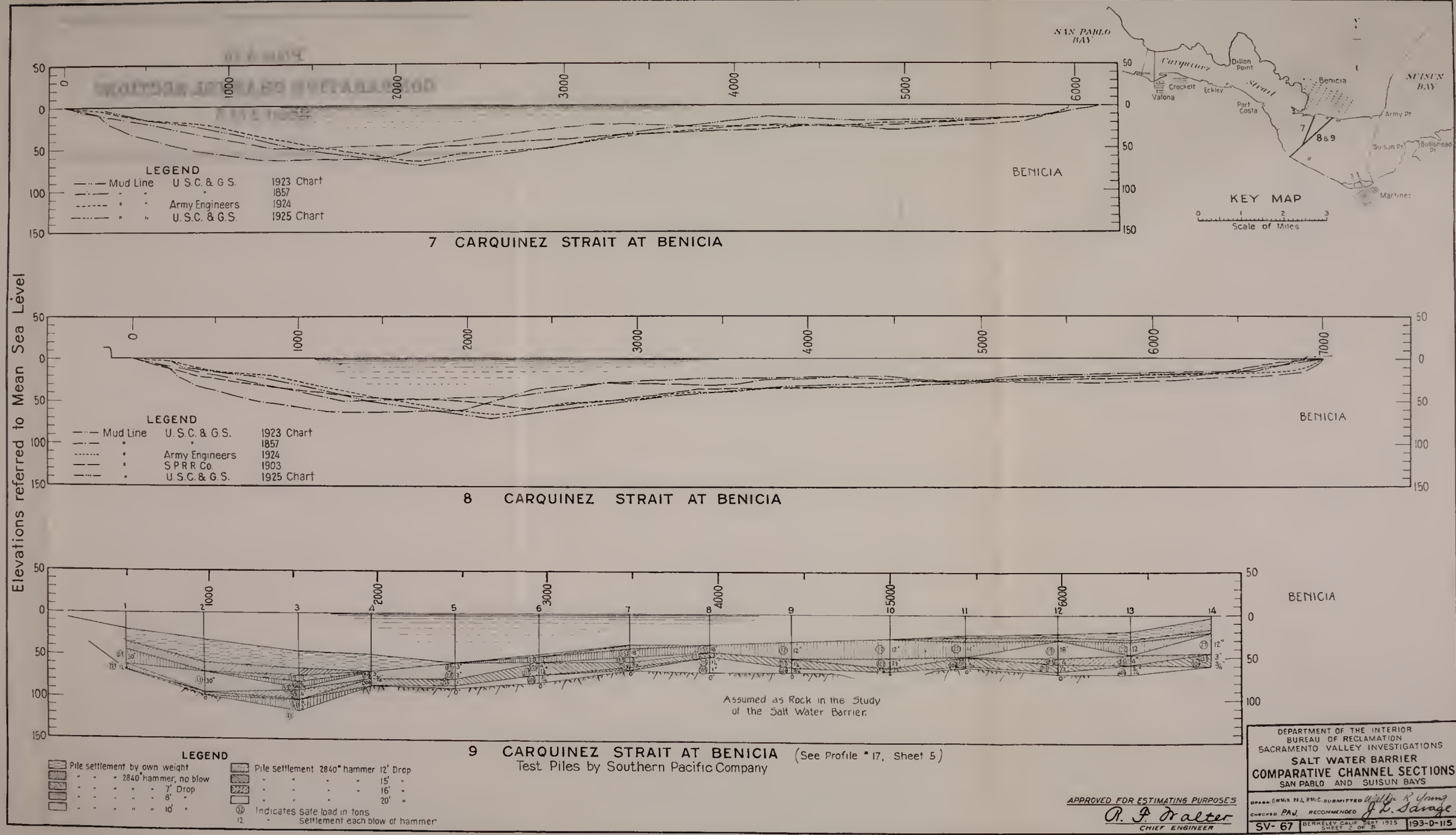
DRAWN GWM, R.P.J., P.M.C. SUBMITTED William R. Young
CHECKED P.A.J. RECOMMENDED J. L. Savage

SV-66 | BERKELEY, CALIF. SEPT 1925 SHEET 1 OF 5 | 193-D-114

Plate 3-16

COMPARATIVE CHANNEL SECTIONS

Sheet 2 of 5



7 CARQUINEZ STRAIT AT BENICIA

8 CARQUINEZ STRAIT AT BENICIA

9 CARQUINEZ STRAIT AT BENICIA (See Profile #17, Sheet 5)
Test Piles by Southern Pacific Company

APPROVED FOR ESTIMATING PURPOSES
R. F. Walter
CHIEF ENGINEER

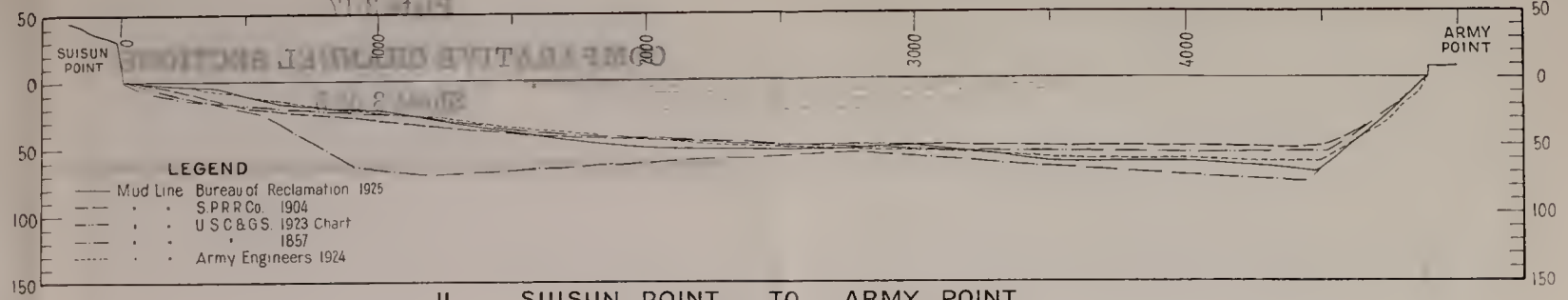
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS
SALT WATER BARRIER
COMPARATIVE CHANNEL SECTIONS
SAN PABLO AND SUISUN BAYS

DRAWN GWMcK PAJ PMcC SUBMITTED Willis R Young
CHECKED PAJ RECOMMENDED J L Savage
SV-67 BERKELEY CALIF SEPT 1925 SHEET 2 OF 5 193-D-115

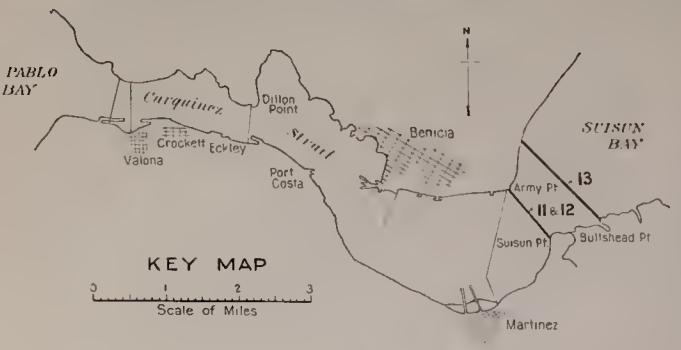
Plate 3-17

COMPARATIVE CHANNEL SECTIONS

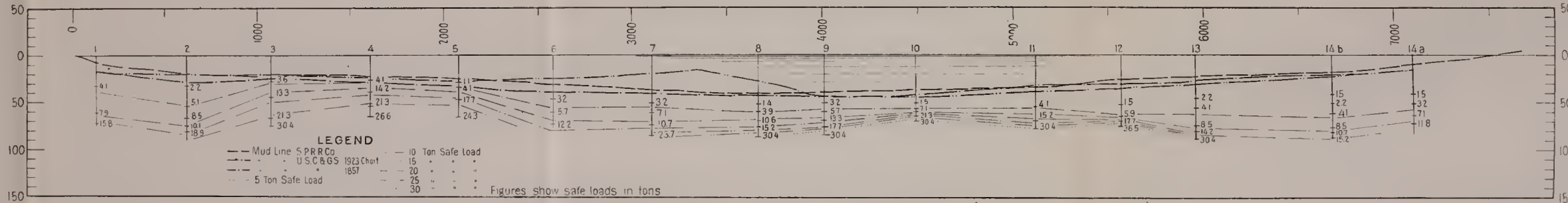
Sheet 3 of 5



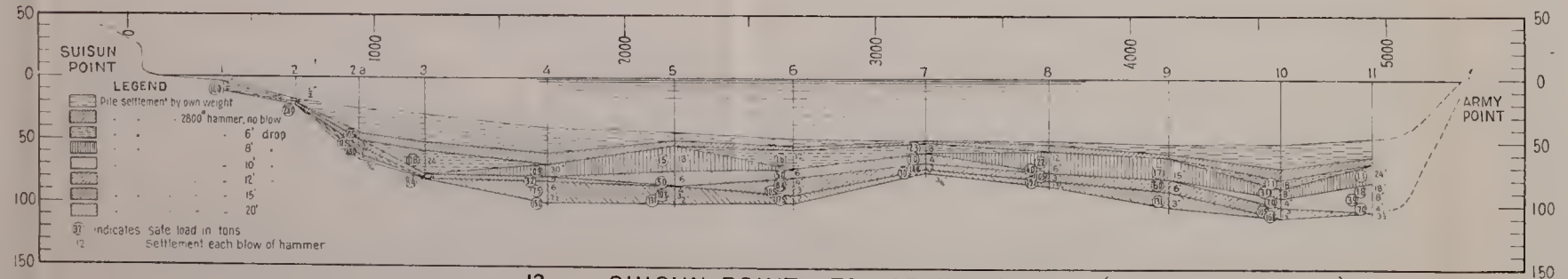
11 SUISUN POINT TO ARMY POINT
(See Drawings SV-50 and SV-57)



Elevations referred to Mean Sea Level



13 SUISUN BAY NEAR ARMY POINT (See Profile "15, Sheet "5)



12 SUISUN POINT TO ARMY POINT (See Profile "16, Sheet "5)
Test Piles by Southern Pacific Company

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A. P. Walter
CHIEF ENGINEER

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SACRAMENTO VALLEY INVESTIGATIONS
SALT WATER BARRIER
COMPARATIVE CHANNEL SECTIONS
SAN PABLO AND SUISUN BAYS

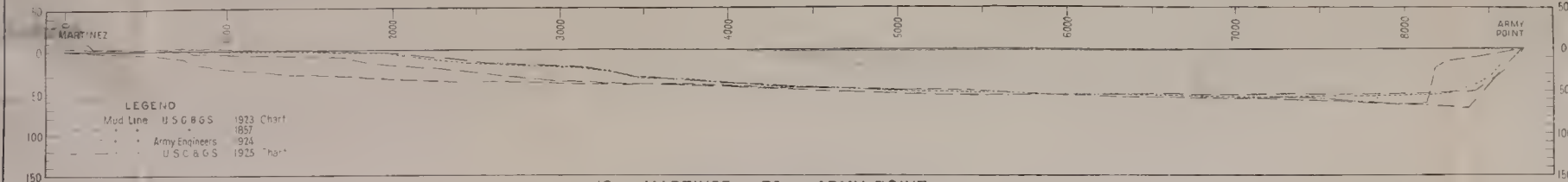
DRAWN G.W.M.R. P.A.J. D.M.C. SUBMITTED J. L. Savage
CHECKED P.A.J. RECOMMENDED J. L. Savage

SV-68 | BERKELEY CALIF SEPT 1925 SHEET 3 OF 5 | 193-D-116

Plate 3-18

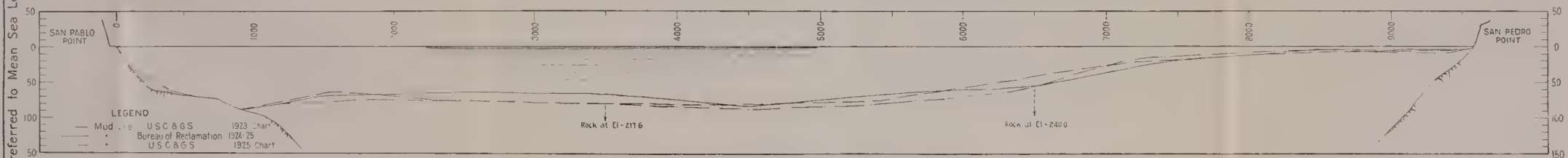
COMPARATIVE CHANNEL SECTIONS

Sheet 4 of 5

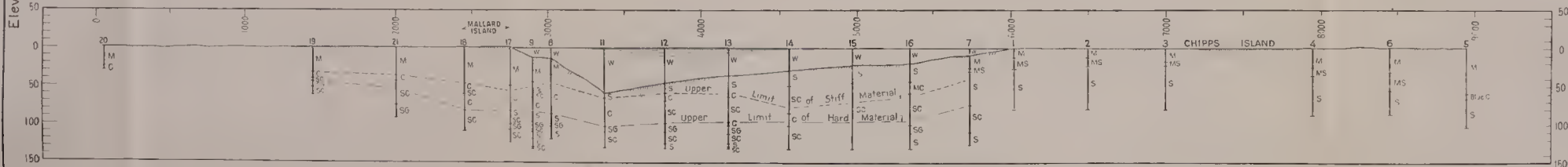


10 MARTINEZ TO ARMY POINT
Line M of Drilling
(See Drawings SV-52 and SV-57)

Elevations referred to Mean Sea Level



1 POINT SAN PABLO TO POINT SAN PEDRO
(See Drawings SV-55 and SV-59)



14 MALLARD ISLAND TO CHIPPS ISLAND
San Francisco-Sacramento R R Crossing

LEGEND
W · Water G · Gravel
M · Mud C · Clay
S · Sand

APPROVED FOR ESTIMATING PURPOSES
A. D. Walter
CHIEF ENGINEER

DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS
SALT WATER BARRIER
COMPARATIVE CHANNEL SECTIONS
SAN PABLO AND SUISUN BAYS

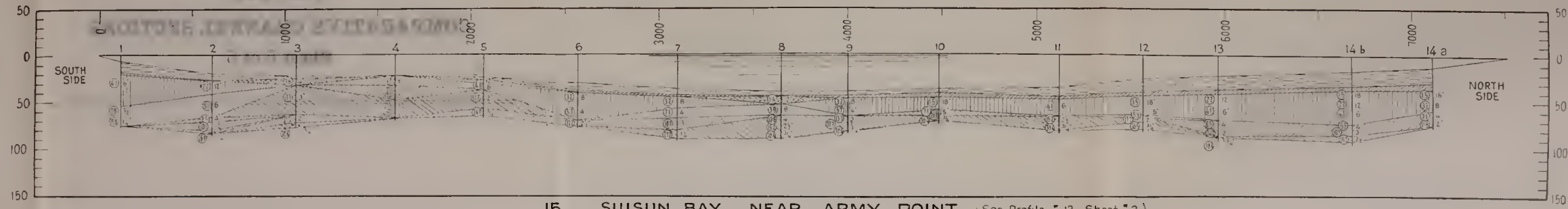
DRAWN 1-1-61 T.J. BW.	SUBMITTED		
TRACED PAJ	RECOMMENDED	L. Savage	
SV-69	BERKELEY CALIF. SCALE AS SHOWN SHEET 1 OF 5		193-D-117

Plate 3-19

COMPARATIVE CHANNEL SECTIONS

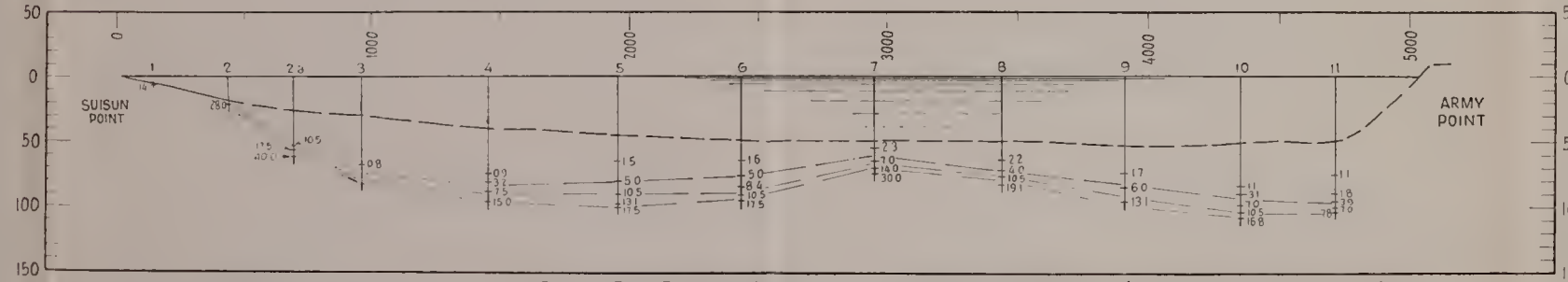
Sheet 5 of 5

Elevations referred to Mean Sea Level



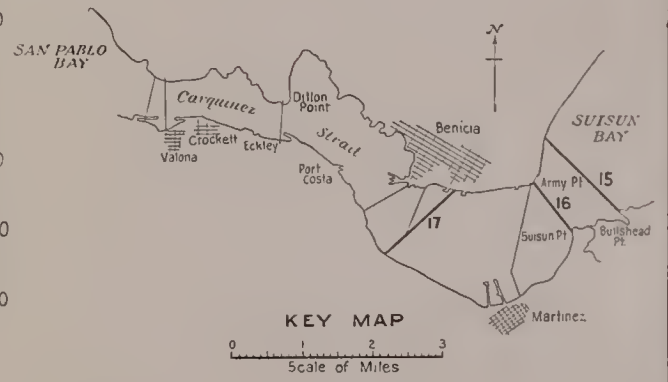
15 SUISUN BAY NEAR ARMY POINT (See Profile "13 Sheet "3)
Test Piles by Southern Pacific Co

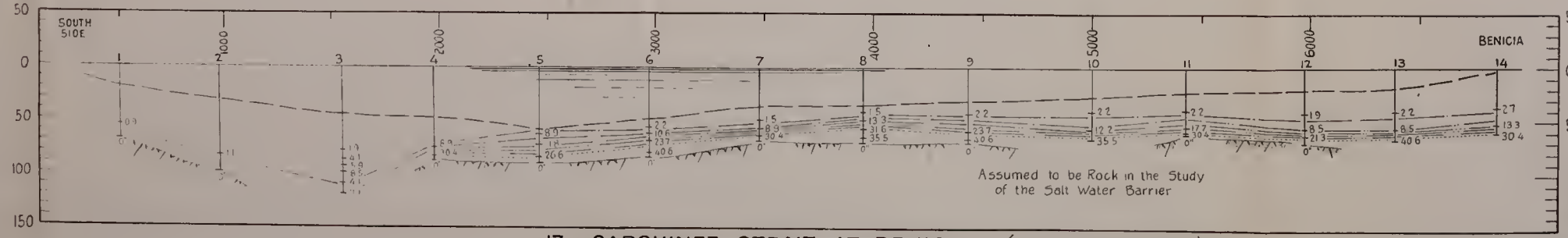
LEGEND
Pile settlement by own weight
2840" hammer no blow
" 4' Drop
" 5' "
" 8' "
Pile settlement 2840" hammer 10' Drop
" " 12' "
" " 15' "
" " 18' "
32 Indicates safe load in tons
12 " settlement each blow of hammer



16 SUISUN POINT TO ARMY POINT (See Profile "12, Sheet "3)
Test Piles by Southern Pacific Co

LEGEND
Mud Line S.P.R.R. Co
5 Ton Safe Load
10 "
15 "
20 Ton Safe Load
25 "
30 "
Figures show safe load in tons





Assumed to be Rock in the Study of the Salt Water Barrier

17 CARQUINEZ STRAIT AT BENICIA (See Profile "9 Sheet "2)
Test Piles by Southern Pacific Co.

APPROVED FOR ESTIMATING PURPOSES
R. F. Walter
CHIEF ENGINEER

DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS
SALT WATER BARRIER
COMPARATIVE CHANNEL SECTIONS
SAN PABLO AND SUISUN BAYS

DRAWN P.A.J., R.M.C. SUBMITTED Walker R. Young
CHECKED P.A.J. RECOMMENDED J. L. Savage

SV-70 | BERKELEY CALIF. SEPT. 1925 SHEET 5 OF 5 | 193-D-118

Plate 3-20

PROFILES OF SACRAMENTO RIVER CHANNEL

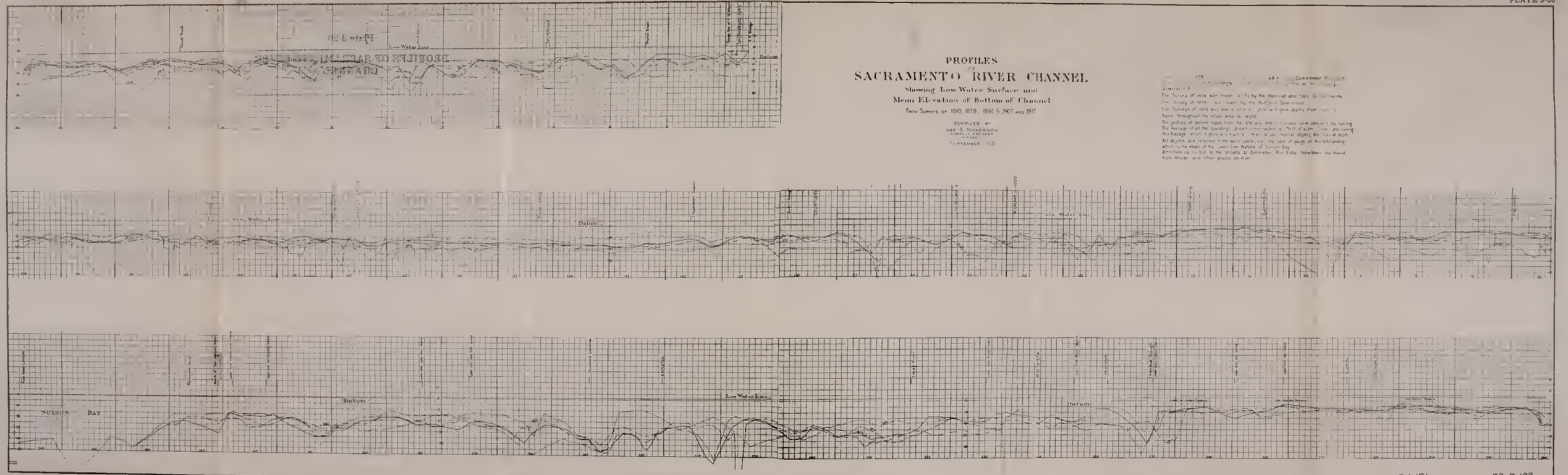
PROFILES OF SACRAMENTO RIVER CHANNEL

Showing Low Water Surface and Mean Elevation of Bottom of Channel

From Surveys of 1849, 1878, 1894-5, 1907 and 1917

COMPILED BY
U.S.C. & G.S.

SEPTEMBER 1920

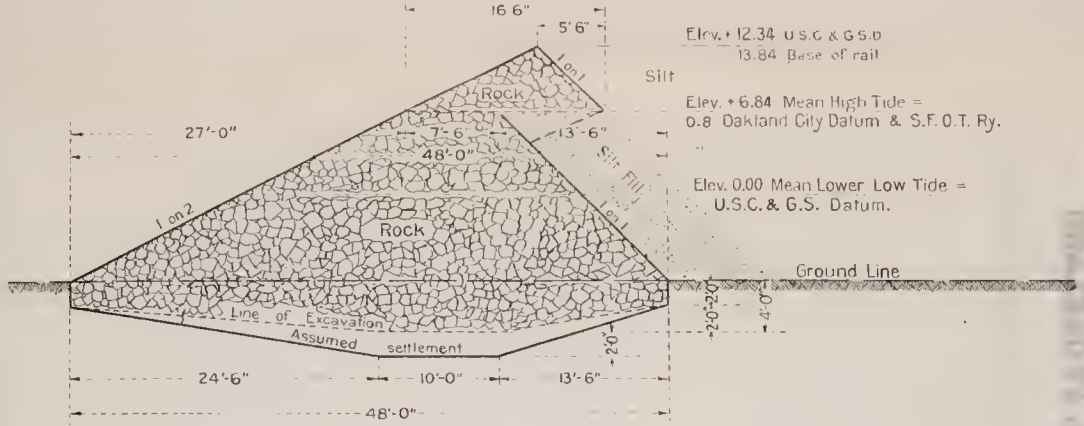


SV-151

93-D-122

Plate 3-21

THEORETICAL CROSS SECTION OF KEY SYSTEM PIER FILL AT OAKLAND



Note : Quantities for typical sections
23.4 cu. yds. rock
5.7 " " excavation.

S. F.-O. TERMINAL RYS.
Maint. of Way & Bldgs. Dept.

References

ALTERNATE PLAN
FOR SEA WALL
FOR PIER FILL

Approved
(s&d) Edward M. Boggs
Asst to Gen. Mgr.

Oakland, Cal. 2-26-13 | Scale 1" = 10' | J. T. M | 9444-D

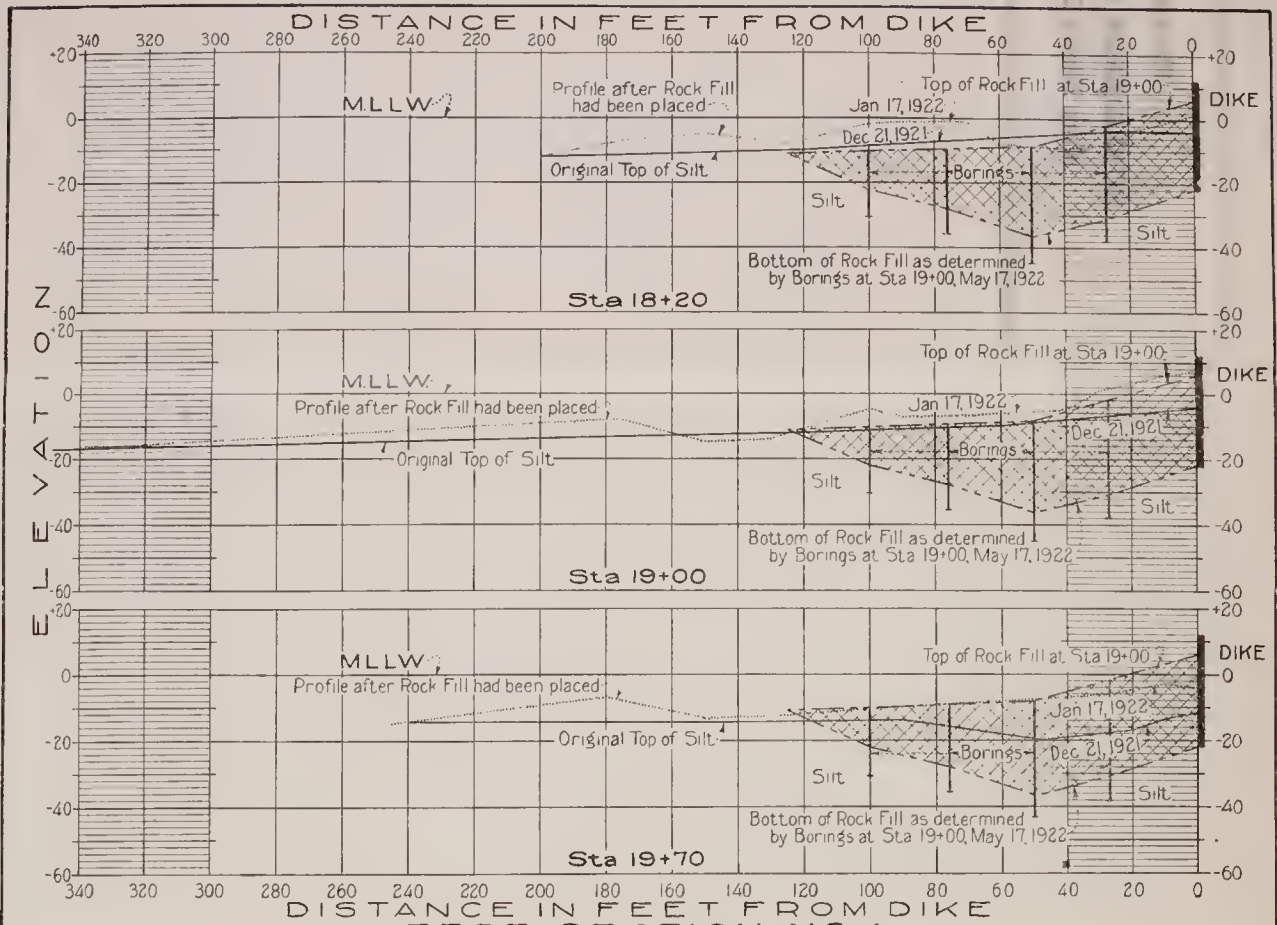
PLATE 3-21

Theoretical cross-section of Key System pier fill at Oakland

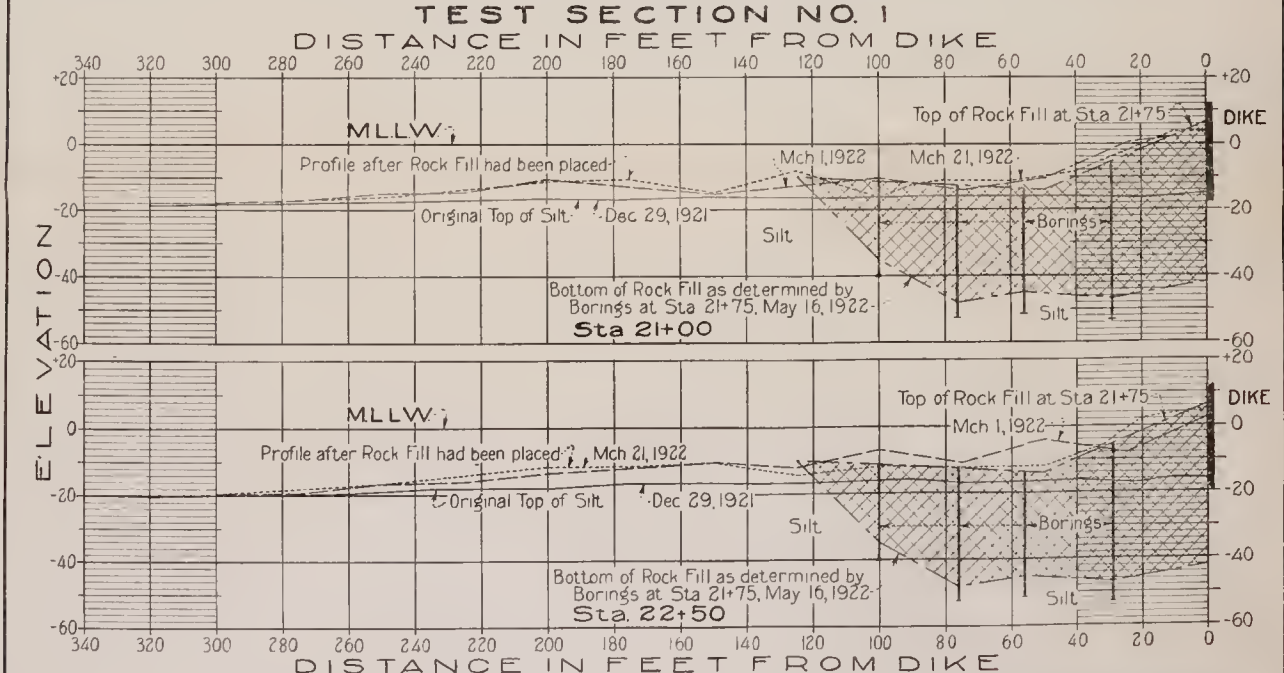
Plate 3-22

SUBSIDENCE TEST DATA

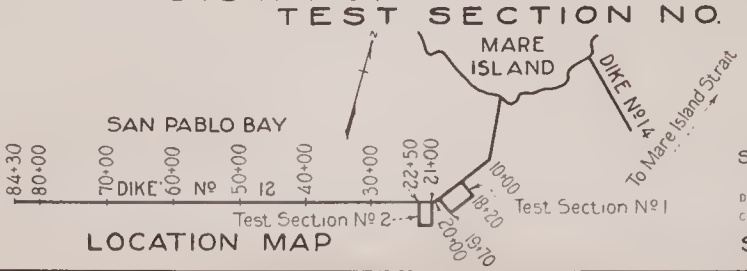
Mare Island Dike No. 12


DISTANCE IN FEET FROM DIKE
340 320 300 280 260 240 220 200 180 160 140 120 100 80 60 40 20 0
ELEVATION
+20 0 -20 -40 -60
M.L.L.W.
Profile after Rock Fill had been placed
Original Top of Silt
Top of Rock Fill at Sta 19+00
Jan 17, 1922
Dec 21, 1921
Borings
Silt
Bottom of Rock Fill as determined by Borings at Sta 19+00, May 17, 1922
DIKE
Sta 18+20
Sta 19+00
Sta 19+70

TEST SECTION NO. 1


DISTANCE IN FEET FROM DIKE
340 320 300 280 260 240 220 200 180 160 140 120 100 80 60 40 20 0
ELEVATION
+20 0 -20 -40 -60
M.L.L.W.
Profile after Rock Fill had been placed
Original Top of Silt
Top of Rock Fill at Sta 21+75
Mch 1, 1922
Mch 21, 1922
Dec 29, 1921
Borings
Silt
Bottom of Rock Fill as determined by Borings at Sta 21+75, May 16, 1922
DIKE
Sta 21+00
Sta 22+50

TEST SECTION NO. 2


MARE ISLAND
DIKE No 14
To Mare Island Strait
SAN PABLO BAY
DIKE No 12
84+30 80+00 70+00 60+00 50+00 40+00 30+00 22+50 21+00 10+00 18+20 20+00 19+70
Test Section No 2
Test Section No 1
LOCATION MAP

APPROVED FOR ESTIMATING PURPOSES
A. P. Walter
CHIEF ENGINEER

DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS
SALT WATER BARRIER
SUBSIDENCE TEST DATA-DIKE No 12
AT MARE ISLAND NAVY YARD

Drawn WRY CAM Submitted W.R. Young
Checked ____ Approved J.L. Savage

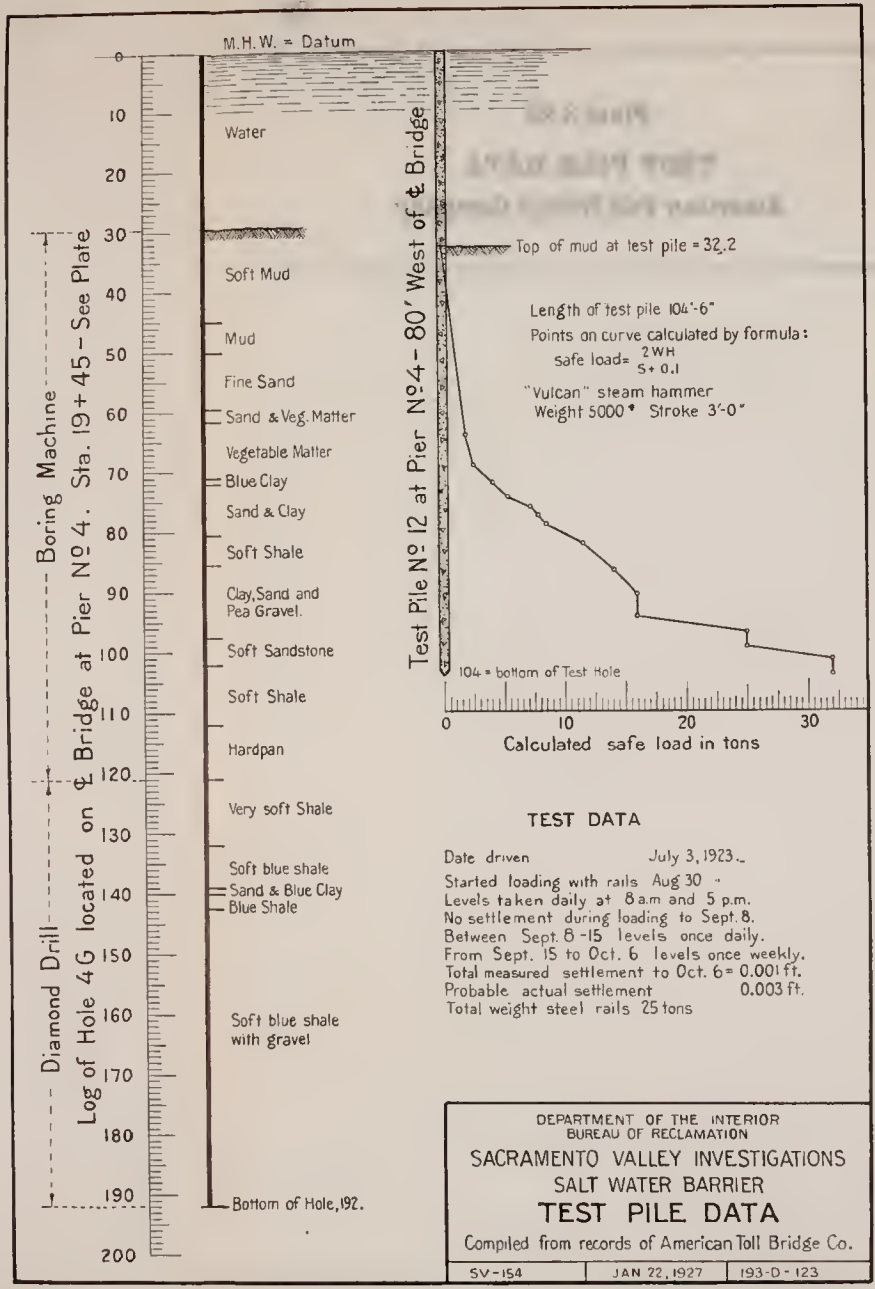
SV-153 Ellensburg Wash June 1927 193-D-108

PLATE 3-22

Plate 3-23

TEST PILE DATA

American Toll Bridge Company


M.H.W. = Datum
Water
Soft Mud
Mud
Fine Sand
Sand & Veg. Matter
Vegetable Matter
Blue Clay
Sand & Clay
Soft Shale
Clay, Sand and Pea Gravel.
Soft Sandstone
Soft Shale
Hardpan
Very soft Shale
Soft blue shale
Sand & Blue Clay
Blue Shale
Soft blue shale with gravel
Bottom of Hole, 192.
Diamond Drill
Boring Machine
Log of Hole 46 located on ℄ Bridge at Pier No 4. Sta. 19+45 - See Plate
Test Pile No 12 at Pier No 4 - 80' West of ℄ Bridge
Top of mud at test pile = 32.2
Length of test pile 104'-6"
Points on curve calculated by formula:
safe load = 2WH / S+0.1
"Vulcan" steam hammer
Weight 5000 # Stroke 3'-0"
104 = bottom of Test Hole
Calculated safe load in tons

TEST DATA

Date driven July 3, 1923.
Started loading with rails Aug 30
Levels taken daily at 8 a.m and 5 p.m.
No settlement during loading to Sept. 8.
Between Sept. 8 -15 levels once daily.
From Sept. 15 to Oct. 6 levels once weekly.
Total measured settlement to Oct. 6 = 0.001 ft.
Probable actual settlement 0.003 ft.
Total weight steel rails 25 tons

DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION

SACRAMENTO VALLEY INVESTIGATIONS
SALT WATER BARRIER

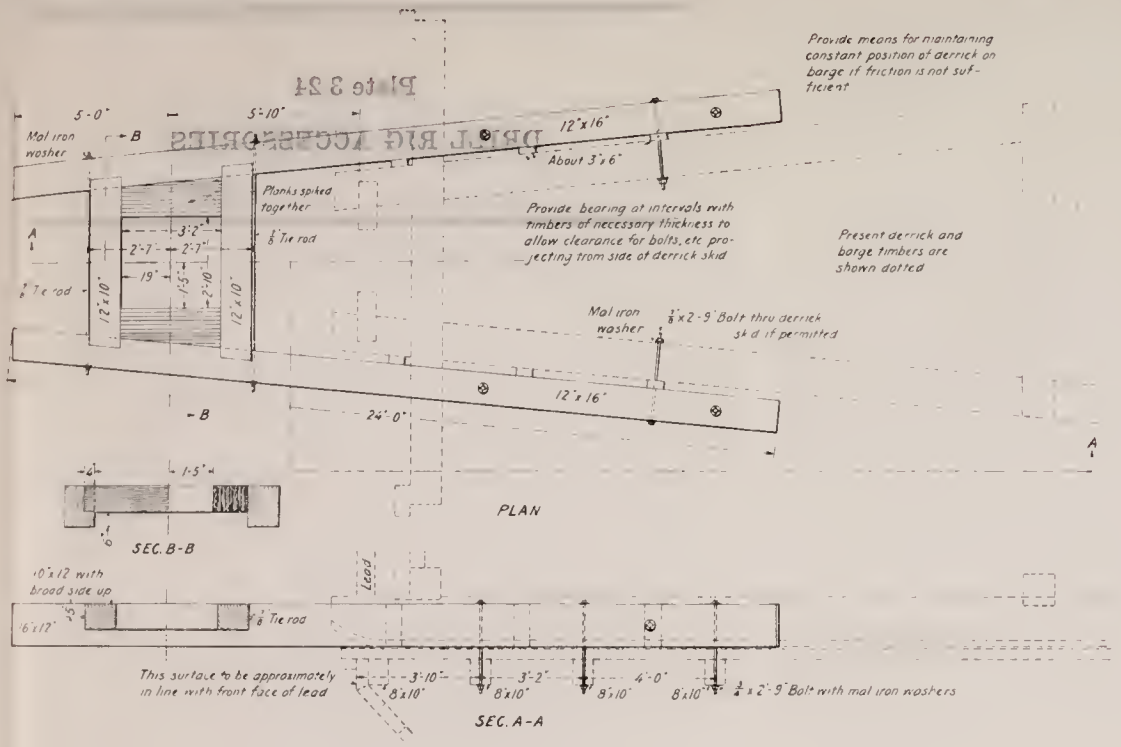
TEST PILE DATA

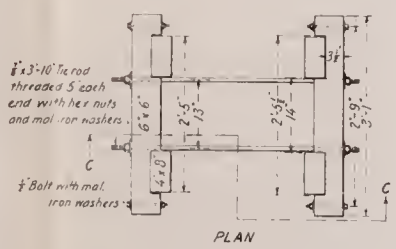
Compiled from records of American Toll Bridge Co.

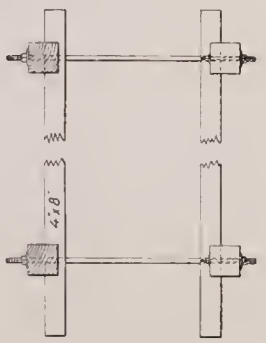
SV-154	JAN 22, 1927	193-D-123

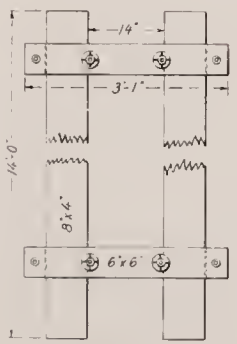
Plate 3-24

DRILL RIG ACCESSORIES

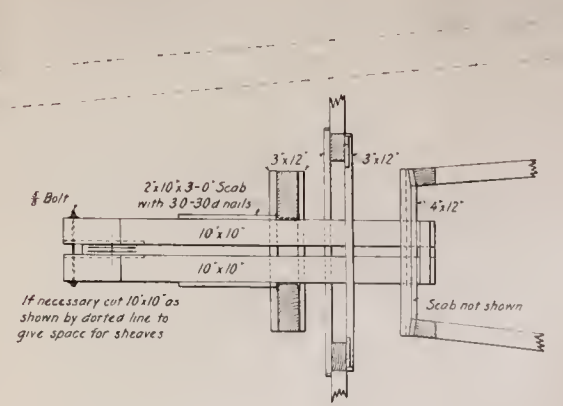




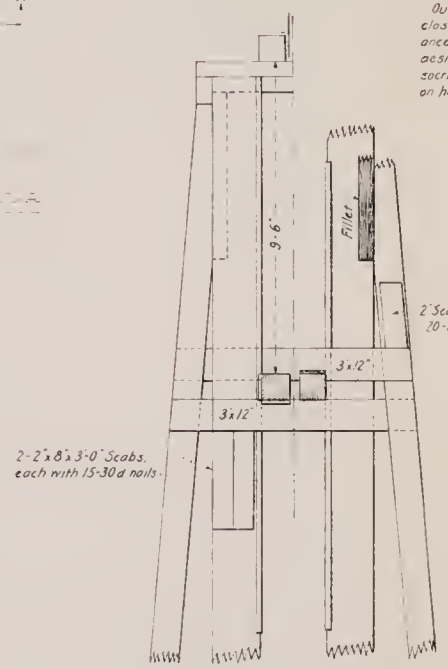


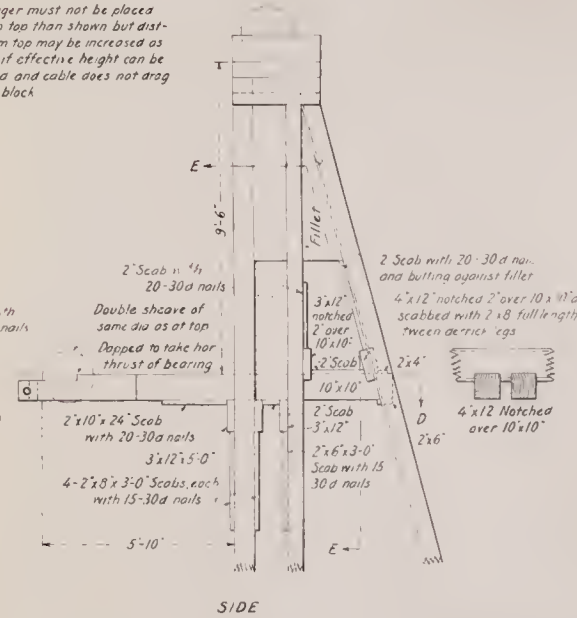


SKIDS FOR DRILL COLUMN



SEC. D-D


Out-rigger must not be placed closer to top than shown but distance from top may be increased as desired if effective height can be sacrificed and cable does not drag on head-block
9'-6"
Fillet
2" Scab with 20-30d nails
3"x12"
3"x12"
2"x10"x24" Scab with 20-30d nails
3"x12"x5'-0"
4-2"x8"x3'-0" Scabs, each with 15-30d nails
2-2"x8"x3'-0" Scabs, each with 15-30d nails
HALF FRONT
HALF E-E



DERRICK OUT-RIGGER

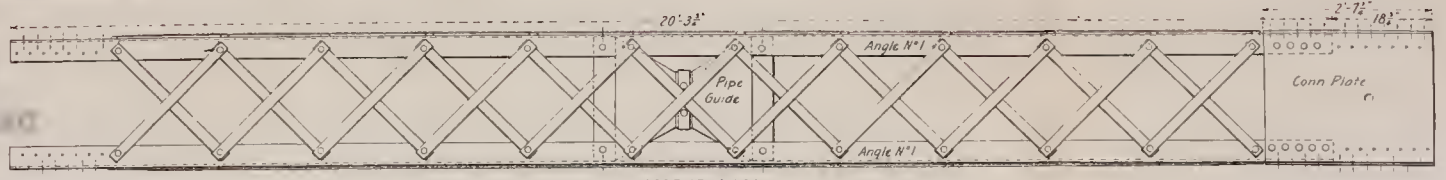
APPROVED FOR ESTIMATING PURPOSES
A. F. Walter
CHIEF ENGINEER

DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS
SALT WATER BARRIER
DRILL RIG ACCESSORIES

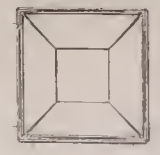
DRAWN N.B.H.	SUBMITTED	W. H. Young	
TRACED	RECOMMENDED	J. L. Savage	
SV-3	Berkeley, Calif., July 17, 1926		193-D-121

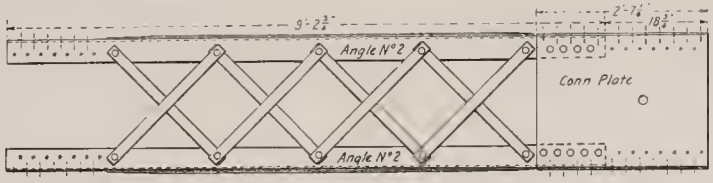
Plate 3-25

DRILL COLUMN

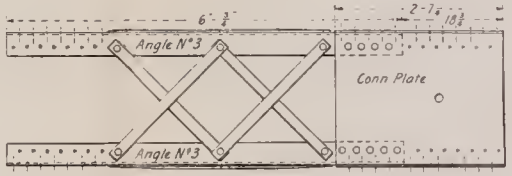


ASSEMBLY N°1
6 Req'd

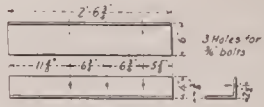




ASSEMBLY N°2
1 Req'd

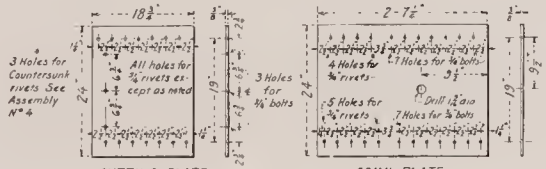


ASSEMBLY N°3
1 Req'd



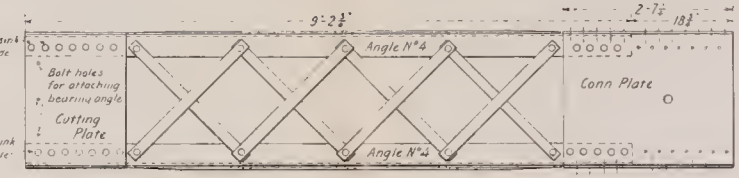
BEARING ANGLE
4 Req'd

NOTES
All rivets and bolts ⅞" dia
All rivets to be shop-driven
Angle N°1 may be made 13" shorter than shown to suit stock on hand, in which case duplicate Assembly N°2 to retain approximate total combined length

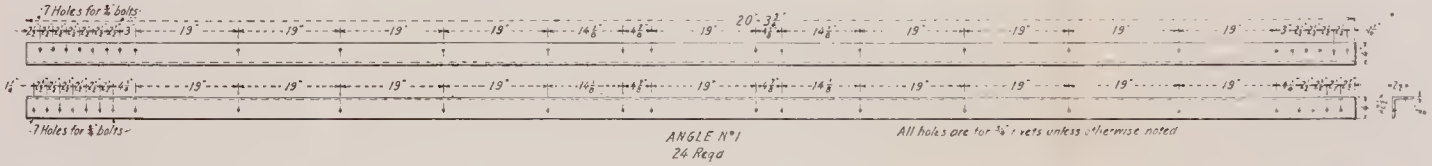

18½"
3 Holes for Countersunk rivets See Assembly N°4
All holes for ⅞" rivets except as noted
3 Holes for ⅞" bolts
2'-7½"
4 Holes for ⅞" rivets
6 Holes for ⅞" bolts
5 Holes for ⅞" rivets
7 Holes for ⅞" bolts
Drill 1¼" dia

CUTTING PLATE
4 Req'd

CONN PLATE
36 Req'd

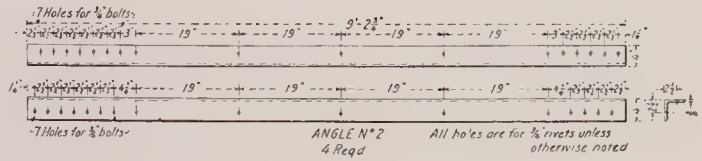


ASSEMBLY N°4
1 Req'd



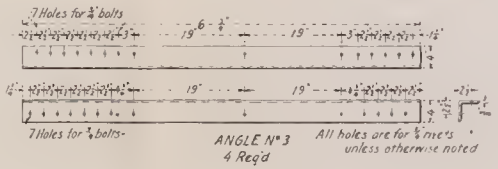
ANGLE N°1
24 Req'd

All holes are for ⅞" rivets unless otherwise noted



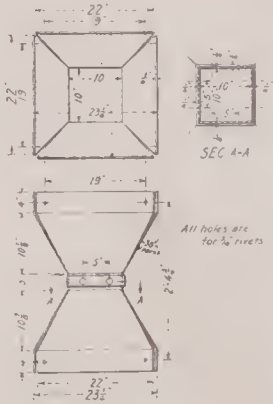
ANGLE N°2
4 Req'd

All holes are for ⅞" rivets unless otherwise noted

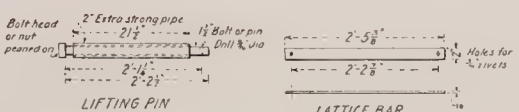


ANGLE N°3
4 Req'd

All holes are for ⅞" rivets unless otherwise noted

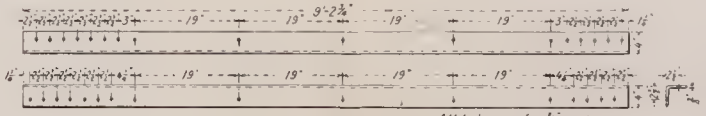


PIPE GUIDE
6 Req'd



LIFTING PIN
2 Req'd

LATTICE BAR
608 Req'd



ANGLE N°4
4 Req'd

All holes are for ¾" rivets

APPROVED FOR ESTIMATING PURPOSES
A. F. Walter
CHIEF ENGINEER

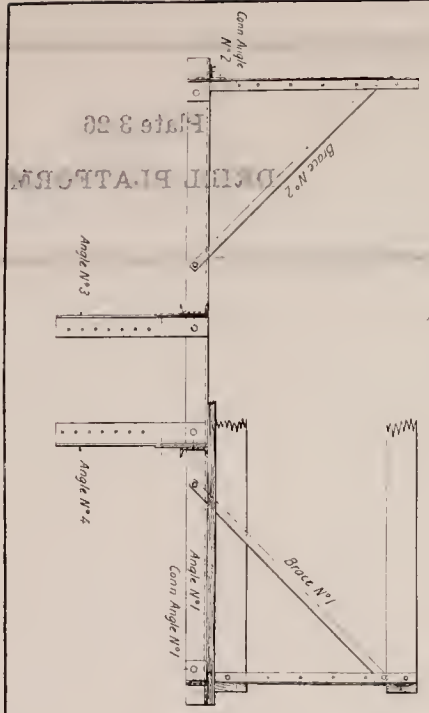
DEPARTMENT OF THE INTERIOR
BUREAU RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS
SALT WATER BARRIER
DRILL COLUMN

DRAWN N.B.H. SUBMITTED
CHECKED RECOMMENDED

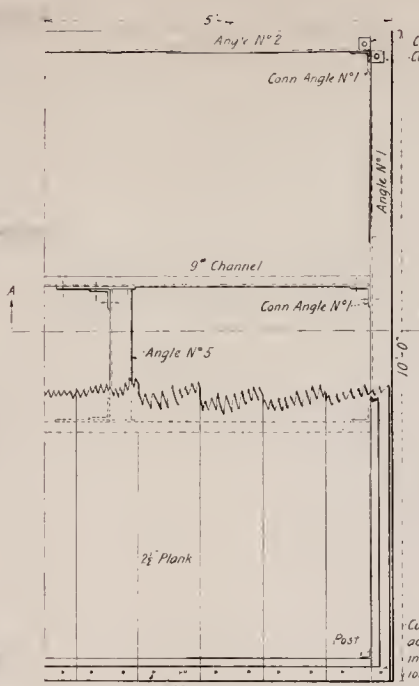
SV-1 | Berkeley, Calif. July 5, 1924 | 193-D-119

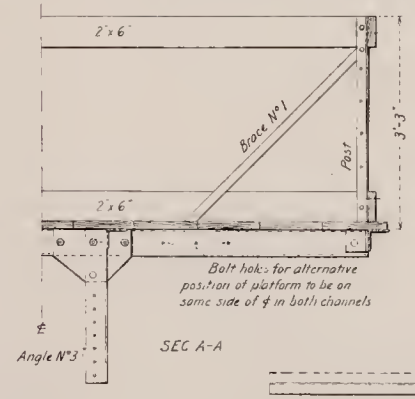
Plate 3-26

DRILL PLATFORM



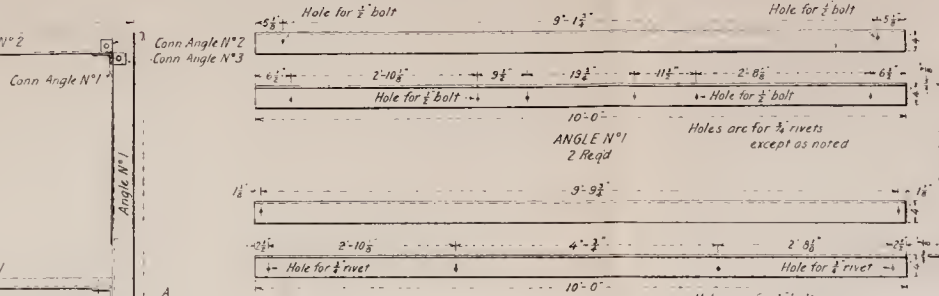
NOTES
All rivets to be shop-driven
All bolts to be hex head and nut
Post, braces and conn angles N° 2 and 3 to be riveted together and bolted to platform

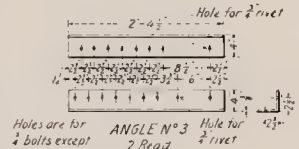


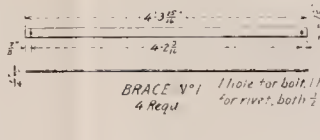


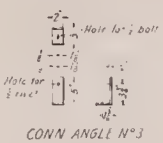
Bolt holes for alternative position of platform to be on same side of ℄ in both channels

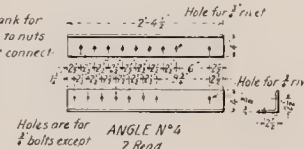
SEC A-A

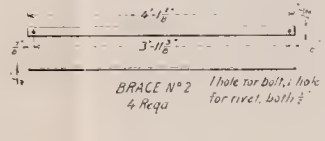

Hole for ¾" bolt
9'-1¾"
Conn Angle N°2
Conn Angle N°3
Hole for ¾" bolt
Hole for ¾" bolt
Hole for ¾" bolt
10'-0"
ANGLE N°1
2 Reqd
Holes are for ¾" rivets except as noted
Additional punching required in Angles N°1 and 2 for 2-¾" carriage bolts in each end of floor plank
9'-9¾"
Hole for ¾" rivet
Hole for ¾" rivet
10'-0"
ANGLE N° 2
2 Reqd
Holes are for ¾" bolts except as noted

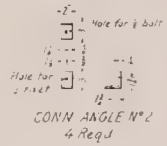


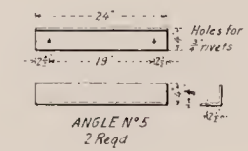


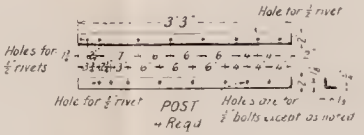


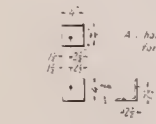

Cut plank for access to nuts in post connections
Hole for ¾" rivet
Hole for ¾" rivet
Holes are for ¾" bolts except as noted
ANGLE N°4
2 Reqd

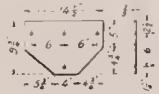


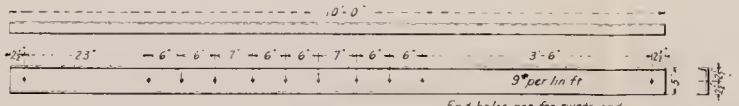












ASSEMBLY

APPROVED FOR ESTIMATING PURPOSES
A. P. Walter
CHIEF ENGINEER

DEPARTMENT OF THE INTERIOR
BUREAU RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS
SALT WATER BARRIER
DRILL PLATFORM

DRAWN N.B.H.	SUBMITTED	W.P. Young	
CHECKED	RECOMMENDED	J.B. Savage	
SV-2	Berkeley, Calif. July 10, 1924		193-D-120

Plate 4-1

ARMY POINT SITE, GENERAL LAYOUT

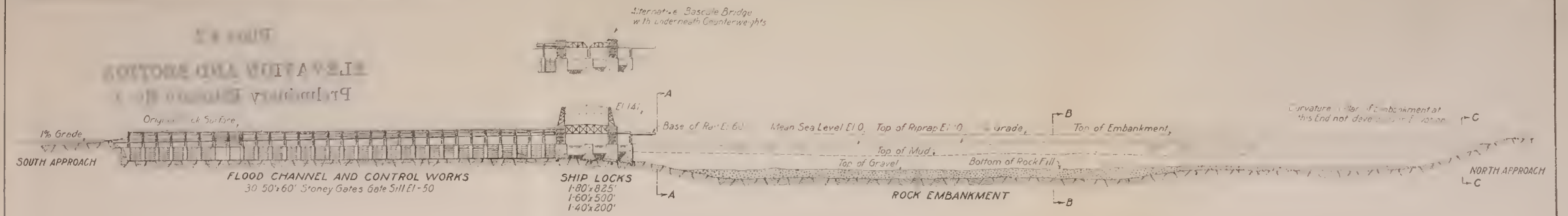
Preliminary Estimate No. 1

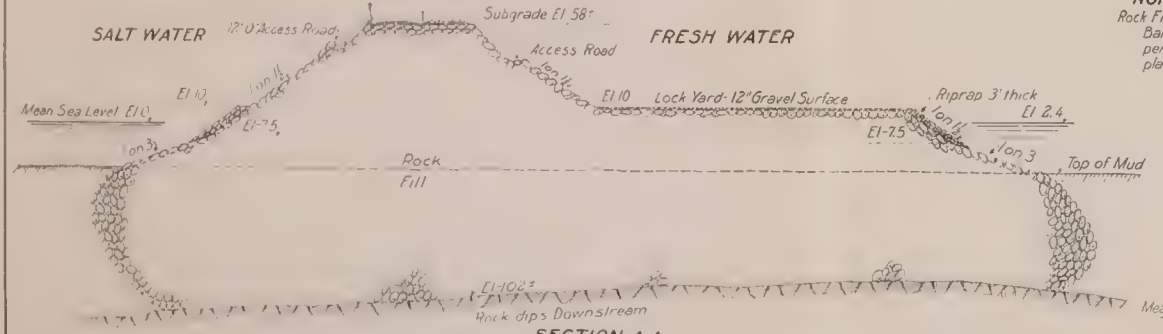
FLOOD CHANNEL
SALT WATER
FRESH WATER
ARMY POINT
Limit of Excavation
Tidal Flat
Marsh at El 3±
MARTINEZ
Scale of Feet
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS
SALT WATER BARRIER
ARMY POINT SITE
GENERAL LAYOUT - PRELIMINARY ESTIMATE NO. 1
JUNE 1956
SV-71 | 183-D-23

Plate 4-2

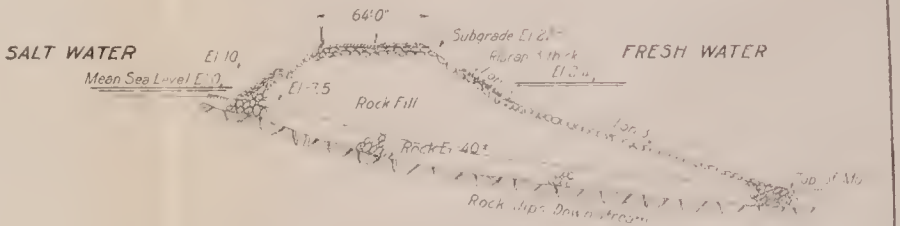
ELEVATION AND SECTION

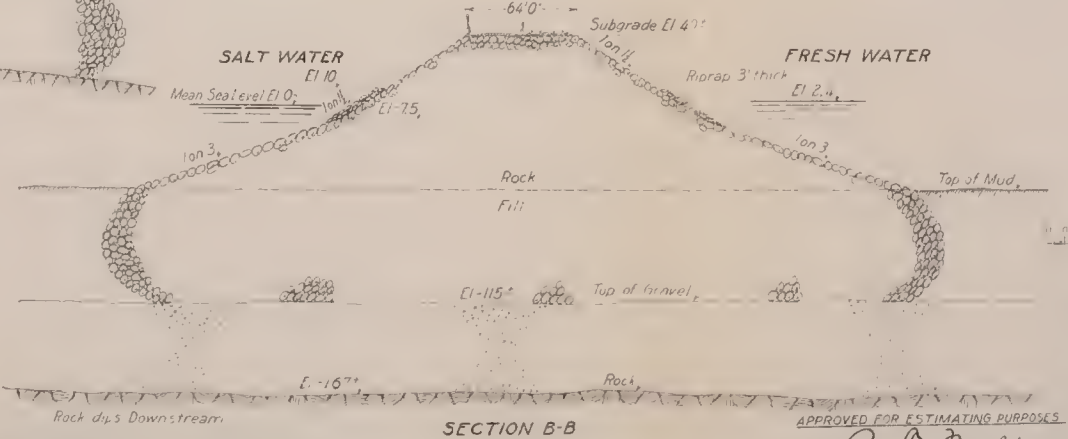
Preliminary Estimate No. 1





Notes:-
Rock Fill to be placed by Bottom Dump Barges up to maximum Elevation permitted by Draft. Remainder to be placed by Derrick Barges and Skips





EMBANKMENT SECTIONS

Scale
PRELIMINARY DESIGN

APPROVED FOR ESTIMATING PURPOSES
A. F. Walter
CHIEF ENGINEER

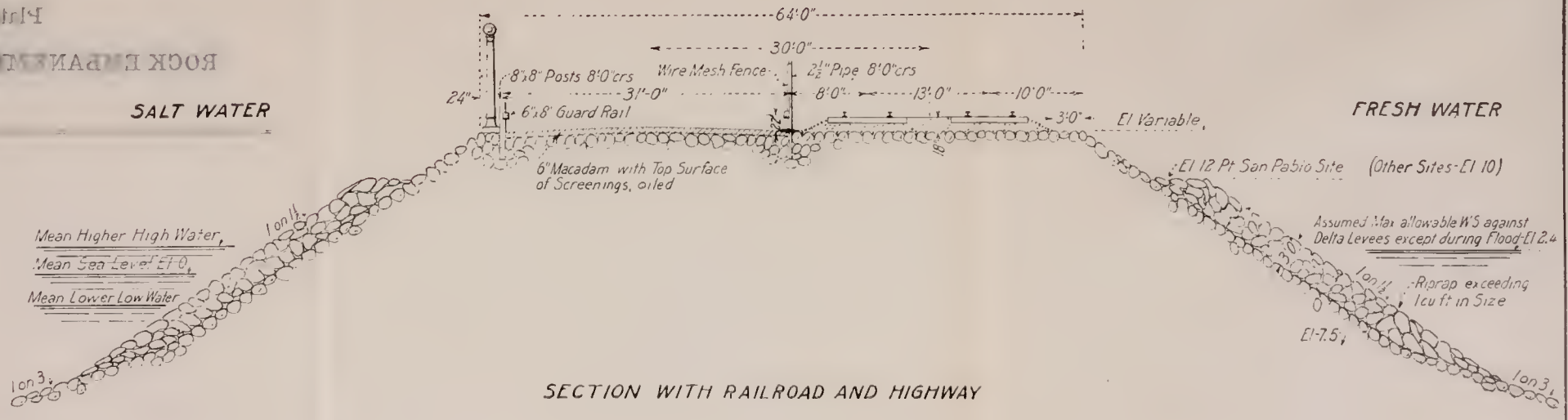
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS
SALT WATER BARRIER
ELEVATION AND SECTIONS
PRELIMINARY ESTIMATE NO 1

DRAWN M J
TRACED J F A M
CHECKED W H
RECOMMENDED: J L Savage
SUBMITTED: [illegible]

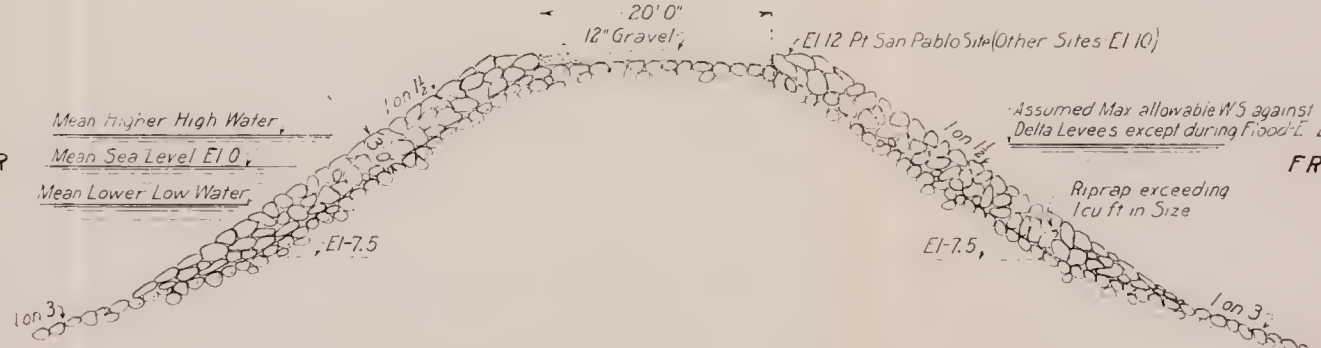
SV-72 | Berkeley, California Feb 6 1926 | 193-D-24

Plate 4-3

ROCK EMBANKMENT, TOP DETAILS



SECTION WITH RAILROAD AND HIGHWAY



SECTION WITHOUT RAILROAD OR HIGHWAY

12'0 5' 10' 15' 20'

Scale

PRELIMINARY DESIGN

APPROVED FOR ESTIMATING PURPOSES

R. F. Walter

CHIEF ENGINEER

DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS

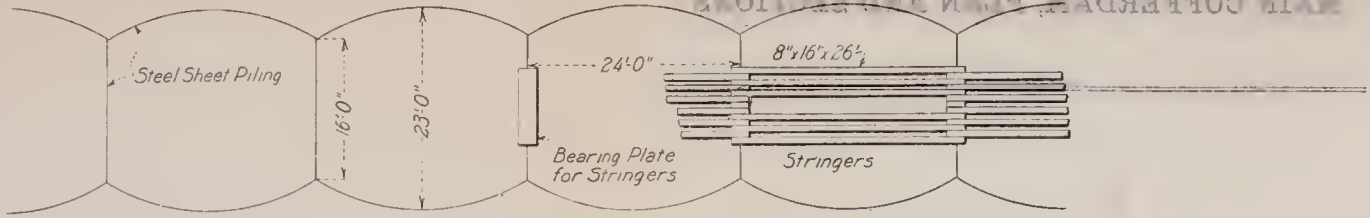
SALT WATER BARRIER
ROCK EMBANKMENT
TOP DETAILS

DRAWN CWN JEV CAS SUBMITTED W.L. Gleason
CHECKED WSH RECOMMENDED L.R. Stranger

SV-73 | Berkeley, Calif 226 126 | 193-D-25

Plate 4-4

MAIN COFFERDAM, PLAN AND SECTIONS



PLAN-SHEET PILING IN PLACE

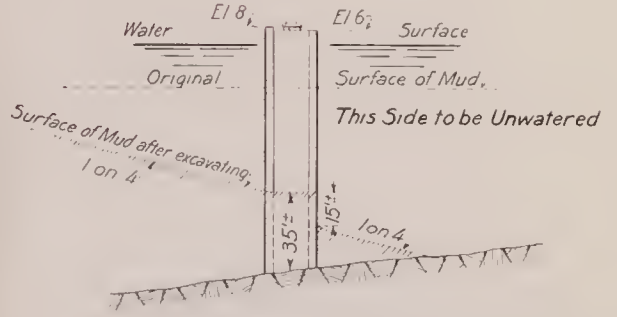
0 5 10' 20' 30 40' 50'

Scale

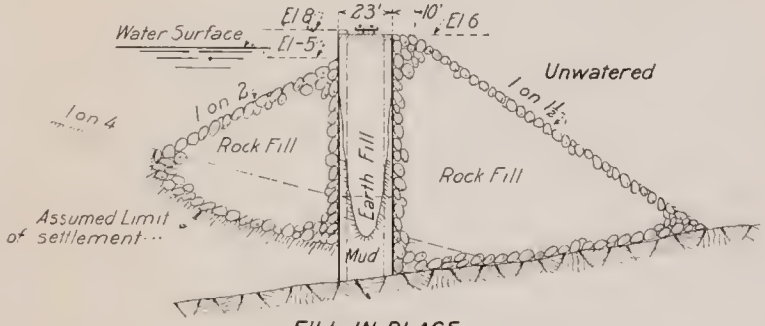
Notes:-

Excavation to proceed along successive Panels of Sheet Piling and be closely followed by Rock Fill to minimize length of unsupported Pile Section

Where Mud does not over lie Rock, the Type of Cofferdam is modified as described in Text



PILING IN PLACE AND EXCAVATION COMPLETED



FILL IN PLACE

SECTIONS

0 10' 50' 100' 150'

Scale

PRELIMINARY DESIGN

DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS
SALT WATER BARRIER
MAIN COFFERDAM
PLAN AND SECTIONS

DRAWN: C.M.J. JR/CM SUBMITTED: J.L. Savage
CHECKED: W.B.H. RECOMMENDED: J.L. Savage

SV-74 | Berkeley Calif. Mch 4, 1926 | 193-D-26

APPROVED FOR ESTIMATING PURPOSES:-

R. F. Walter
CHIEF ENGINEER

Plate 4-5

CONTROL WORKS, 50′ x 60′ GATE

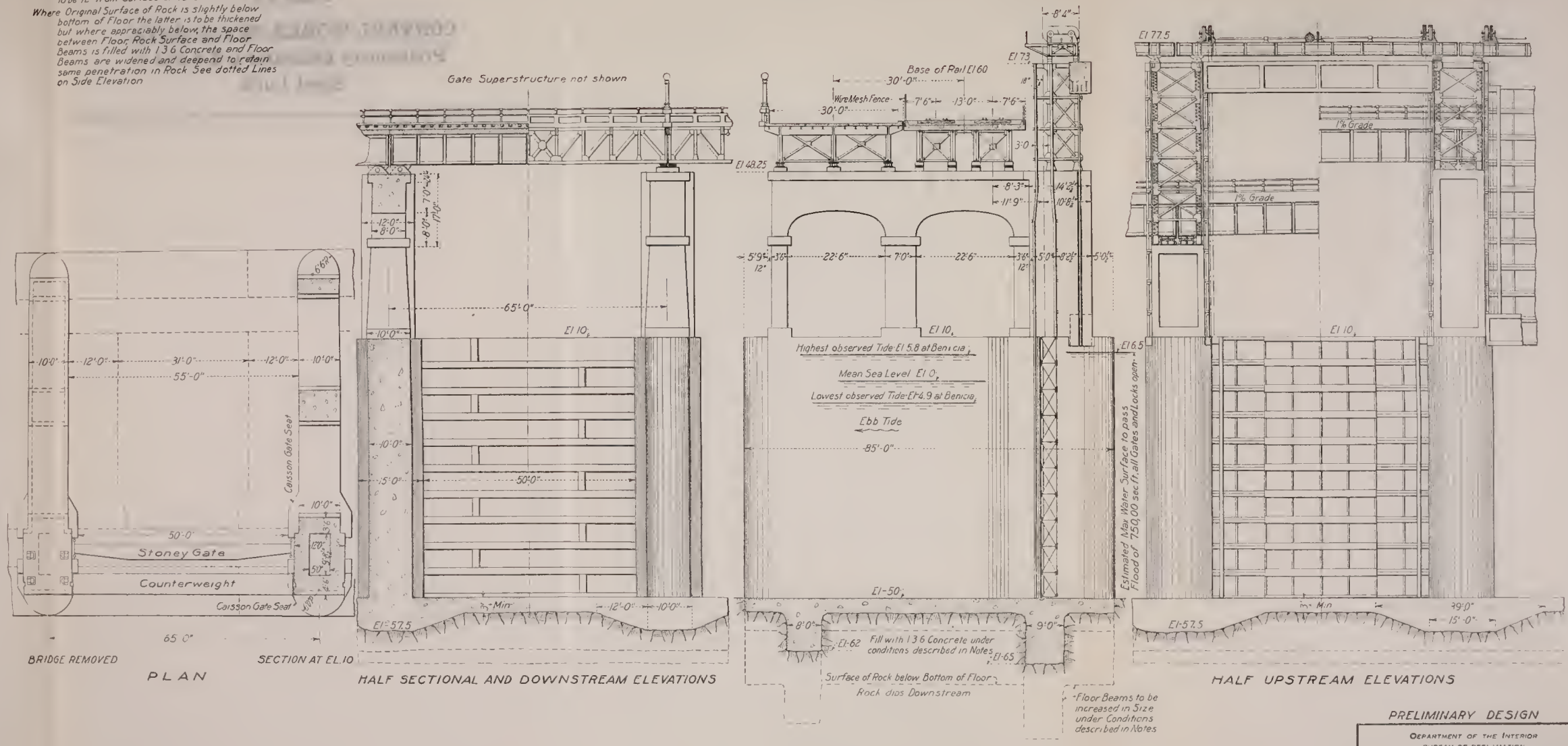
Preliminary Estimates 1, 3, 4 and 7

Sheet 1 of 2

Notes:-

Reinforcing Steel not shown In Salt Water, same to be 12" from Surface of Concrete

Where Original Surface of Rock is slightly below bottom of Floor the latter is to be thickened but where appreciably below, the space between Floor, Rock Surface and Floor Beams is filled with 1:3:6 Concrete and Floor Beams are widened and deepend to retain same penetration in Rock See dotted Lines on Side Elevation



PRELIMINARY DESIGN

DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS
SALT WATER BARRIER
CONTROL WORKS- 50'x60' GATE
PRELIMINARY ESTIMATES NOS 1,3,4 AND 7

DRAWN M.J.ST.CAM. SUBMITTED W. H. Storey
CHECKED W.B.M. RECOMMENDED A. L. Savage

APPROVED FOR ESTIMATING PURPOSES
A. P. Walter
CHIEF ENGINEER

SV-75 | Berkeley, California Feb. 1930 | 193-D-27

Plate 4-6

CONTROL WORKS, 50′ x 60′ GATE

Preliminary Estimates 1, 3, 4 and 7

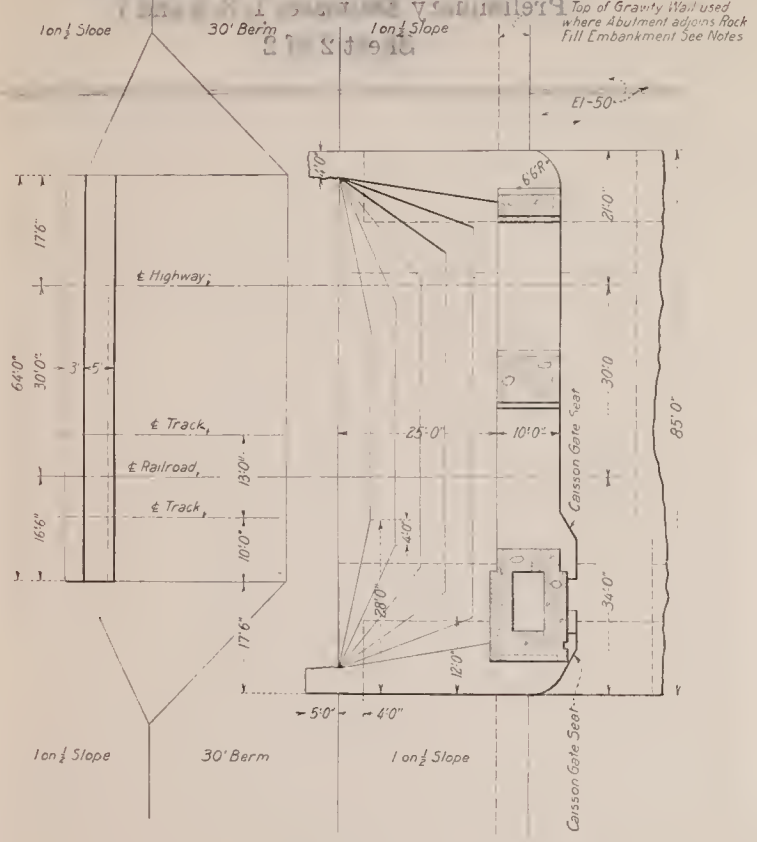
Sheet 2 of 2

Notes

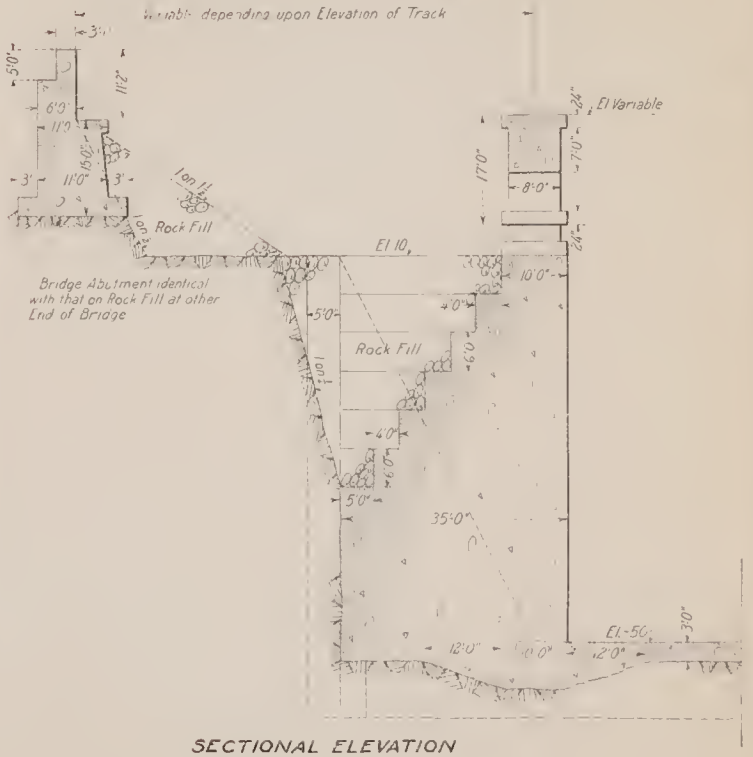
Abutment Pier shown on this Drawing is to be used adjacent to Side of Rock Fill for Flood Channel with 50' Stoney Gates. The Abutment for 70' Gates is of the same Type

In Cases where Rock Fill Embankment adjoins Control Works, Gravity Walls extend Upstream and Downstream from Ends of Abutment shown on this Drawing with Tops flush with Surface of Fill and terminate where Surface of Fill reaches El 50 or El 70. The Slope Lining is then omitted and the Abutment Wings are replaced by Cutoffs

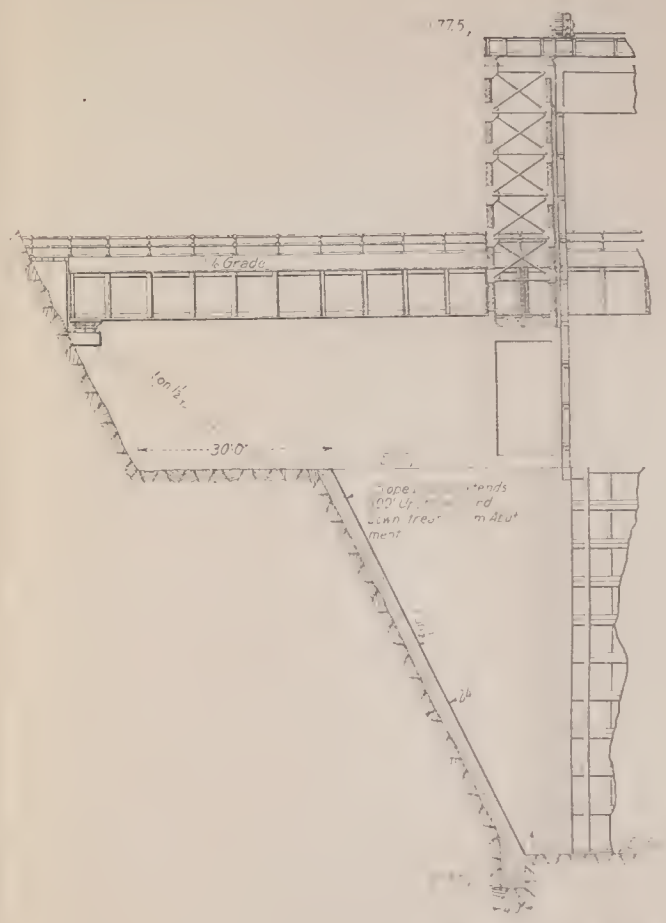
Reinforcing Steel not shown. In Salt Water, Same to be 12" from Surface of Concrete.



PLAN


Variable depending upon Elevation of Track
El Variable
Rock Fill
El 10'
Bridge Abutment identical with that on Rock Fill at other End of Bridge
Rock Fill
El-50'

SECTIONAL ELEVATION



UPSTREAM ELEVATION

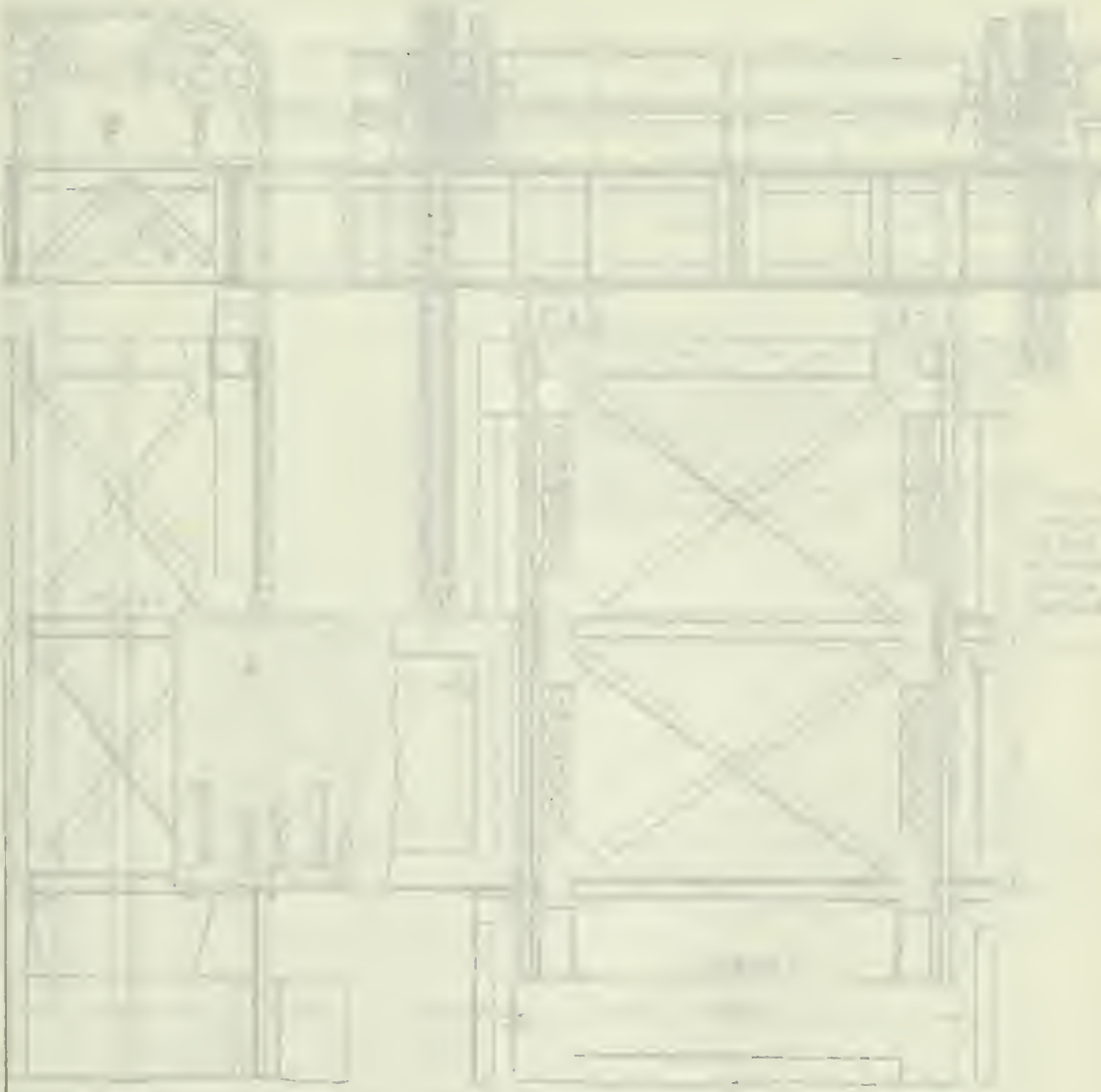
Scale
PRELIMINARY DESIGN

APPROVED FOR ESTIMATING PURPOSES
A. F. Walter
CHIEF ENGINEER

DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS
SALT WATER BARRIER
CONTROL WORKS - 50'x60' GATE
DWG. NO. SV-76 | 193-D-28

Plate 4-7

SUPERSTRUCTURE FOR STONEY GATE
50′ x 60′ GATE



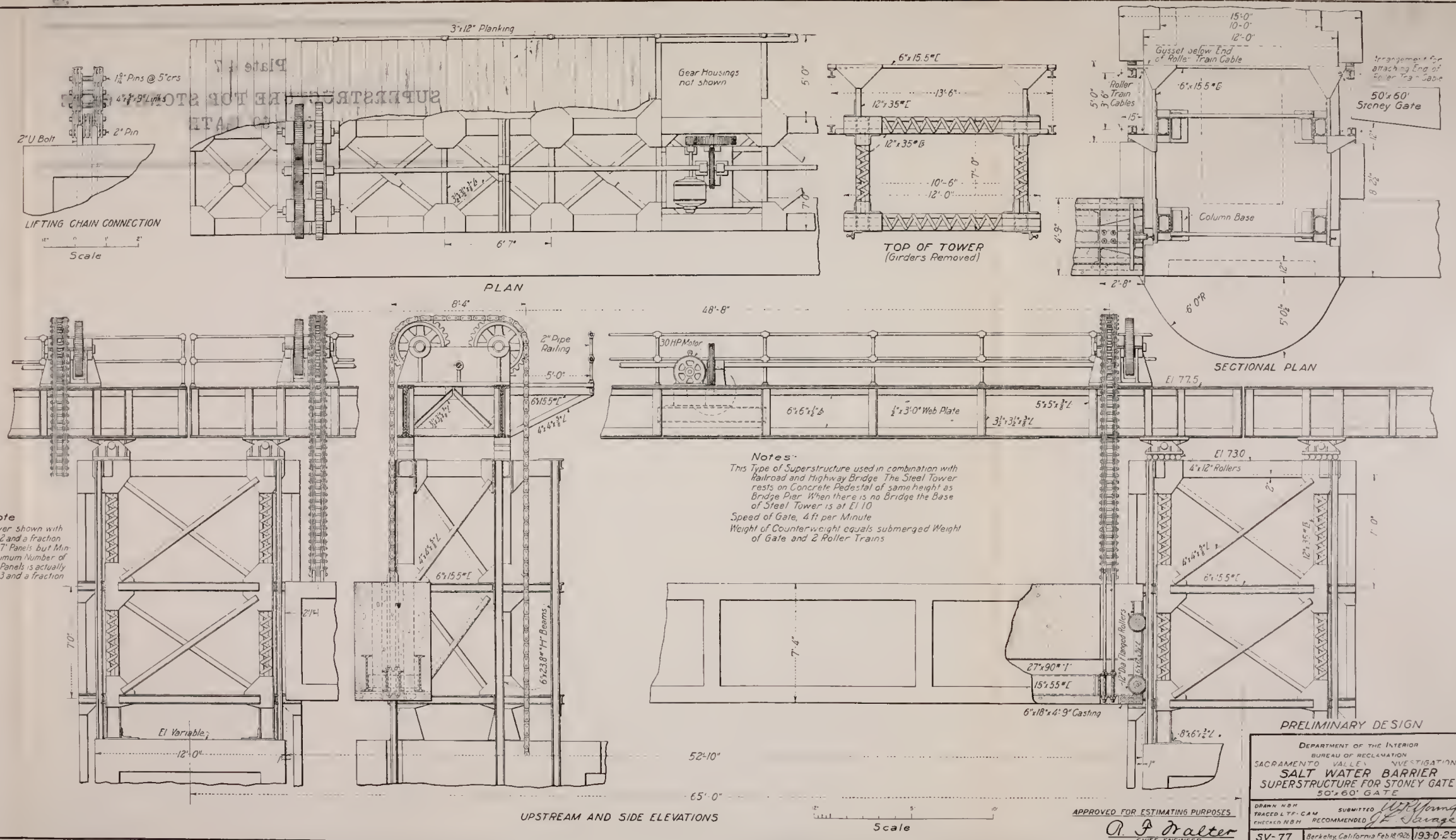
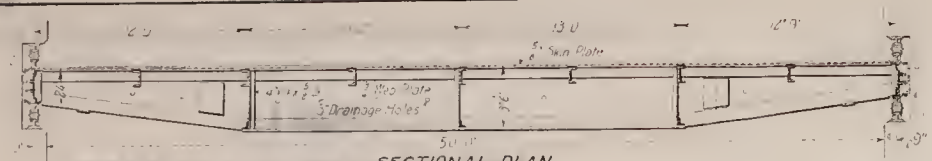
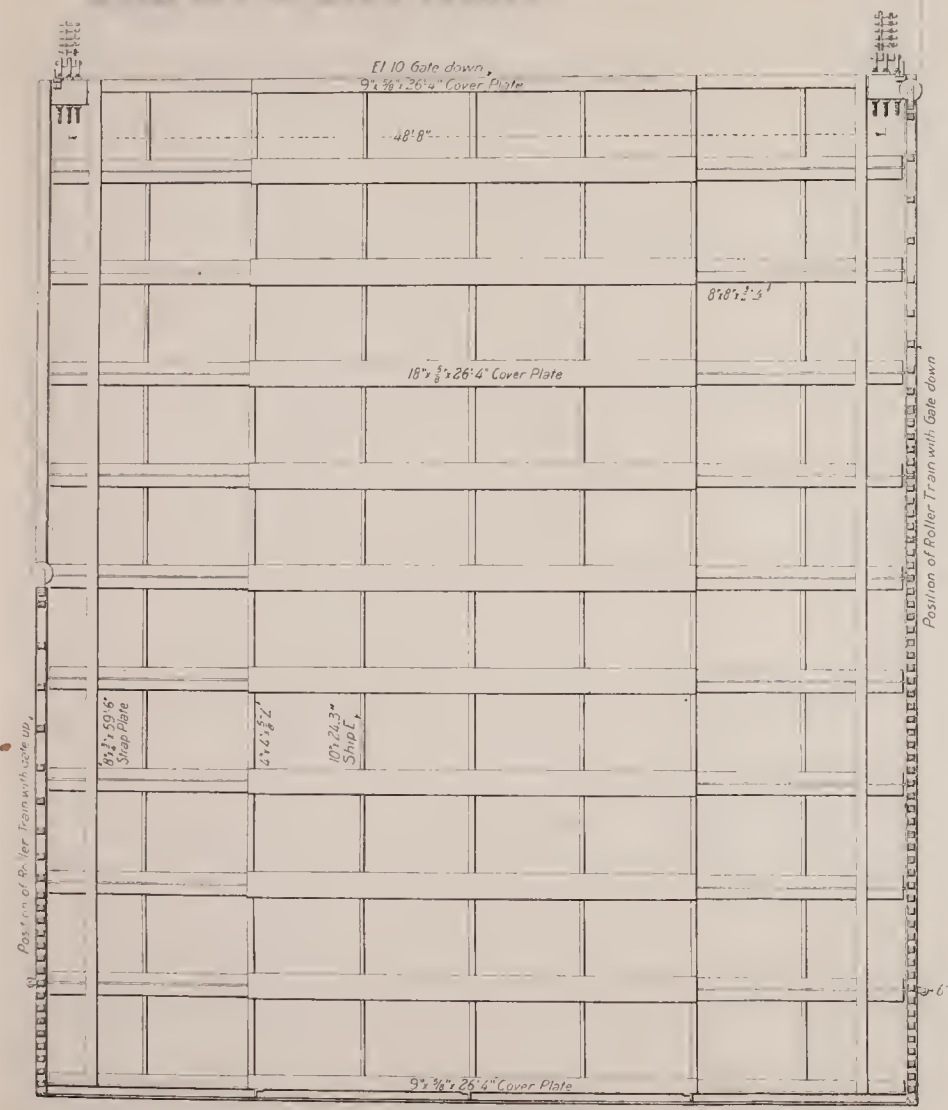

3"x12" Planking
Gear Housings not shown
6'7"
PLAN
1⅞" Pins @ 5"crs
4"x3" Links
2" U Bolt
2" Pin
LIFTING CHAIN CONNECTION
Scale
6"x15.5"C
13'6"
12"x35"C
10'-6"
12'-0"
7'-0"
TOP OF TOWER
(Girders Removed)
15'-0"
10'-0"
12'-0"
Gusset below End of Roller Train Cable
Arrangement for attaching End of Roller Train Cable
Roller Train Cables
5'0"
3'6"
15'
50'x60' Stoney Gate
Column Base
4'9"
2'-8"
6'0"R
5'0"
SECTIONAL PLAN
8'4"
2" Pipe Railing
5'-0"
6"x15.5"C
4"x4"x⅜"L
48'-8"
30 HP Motor
El 77.5
6"x6"x⅝"L
½"x3'0" Web Plate
5"x5"x⅞"L
3½"x3½"x⅞"L
El 73.0
4"x12" Rollers
2'-
1'-0"
12"x35"C
4"x4"x⅝"L
6"x15.5"C
Note
Tower shown with 2 and a fraction 7' Panels but Minimum Number of Panels is actually 3 and a fraction
Notes
This Type of Superstructure used in combination with Railroad and Highway Bridge The Steel Tower rests on Concrete Pedestal of same height as Bridge Pier When there is no Bridge the Base of Steel Tower is at El 10
Speed of Gate, 4 ft per Minute
Weight of Counterweight equals submerged Weight of Gate and 2 Roller Trains
7'-4"
27"x90"#1"
15"x55"C
12"Dia Flanged Rollers
6"x18"x4'-9" Casting
8"x6"x¾"L
1"
7'0"
2'1½"
6"x15.5"C
6"x23.8"H" Beams
El Variable
12'-0"
52'-10"
65'-0"
UPSTREAM AND SIDE ELEVATIONS
Scale
APPROVED FOR ESTIMATING PURPOSES
R. F. Walter
CHIEF ENGINEER
PRELIMINARY DESIGN
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS
SALT WATER BARRIER
SUPERSTRUCTURE FOR STONEY GATE
50'x60' GATE
DRAWN N.B.M.
TRACED L.T.F.-C.A.M.
CHECKED N.B.M.
SUBMITTED W.P. Young
RECOMMENDED J.L. Savage
SV-77
Berkeley, California Feb 18 1926
193-D-29

Plate 4-8

STONEY GATE, 50′ x 60′ GATE

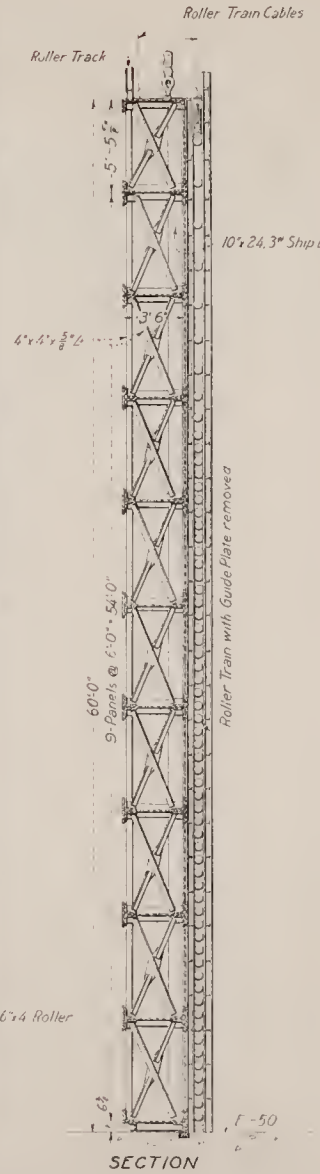


SECTIONAL PLAN

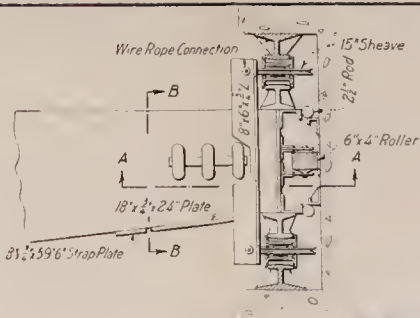

El 10 Gate down
9"x 5/8"x 26'-4" Cover Plate
48'-8"
8"x 8"x 3/4" L
18"x 5/8"x 26'-4" Cover Plate
Position of Roller Train with Gate down
Position of Roller Train with Gate up
8 1/2"x 59'-6" Strap Plate
4"x 4"x 5/8" L
10"x 24.3" Ship C
6"x 4" Roller
9"x 5/8"x 26'-4" Cover Plate

UPSTREAM ELEVATION

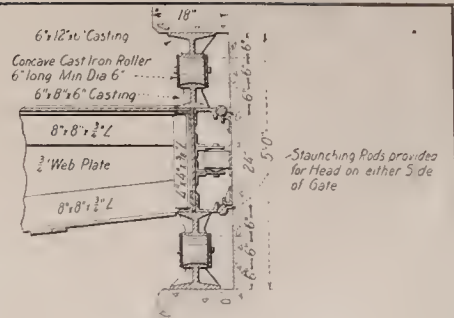
Scale



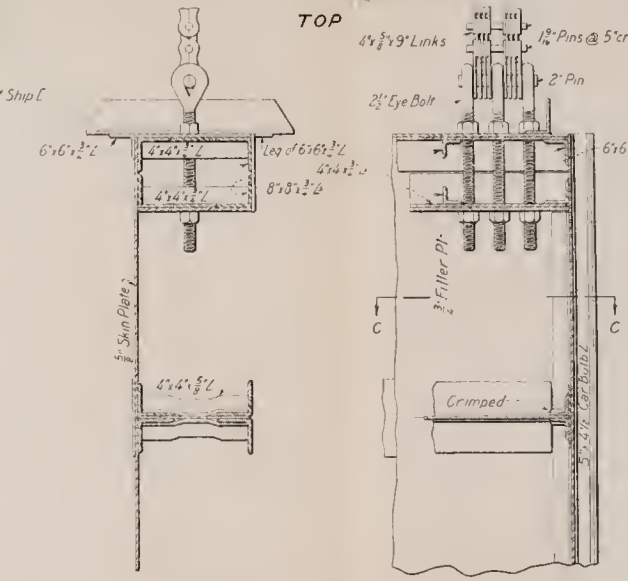
SECTION



TOP


6"x 12"x L" Casting
Concave Cast Iron Roller
6" long Min Dia 6"
6"x 8"x 6" Casting
8"x 8"x 3/4" L
3/4" Web Plate
8"x 8"x 3/4" L
Staunching Rods provided for Head on either Side of Gate

SECTION G-G

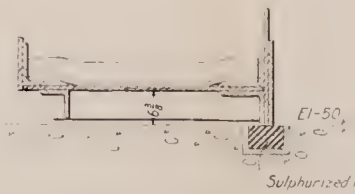


SECTION B-B

SECTION A-A

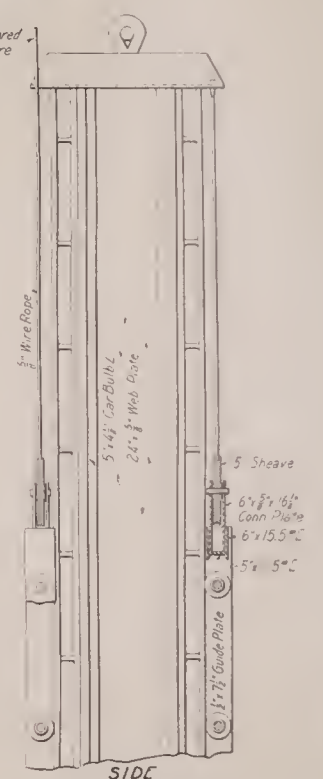
DETAILS AT UPPER CORNER

Scale



BOTTOM DETAIL

Scale


End of Rope anchored to Superstructure
5/8" Wire Rope
5"x 41" Car Built L
24"x 3/8" Web Plate
5 Sheave
6"x 5/8"x 16 1/2" Conn Plate
6"x 15.5" C
5"x 5" C
2"x 7 1/2" Guide Plate

SIDE

PRELIMINARY DESIGN

APPROVED FOR ESTIMATING PURPOSES

A. F. Walter

CHIEF ENGINEER

DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS
SALT WATER BARRIER
50' x 60' STONEY GATE
GATE SILL ELEVATION -50

DRAWN JV SUBMITTED
CHECKED RECOMMENDED

SV-78 | 193-D-30

Plate 4-9

SHIP LOCKS, LAYOUT

Preliminary Estimates 1 to 6, Inclusive

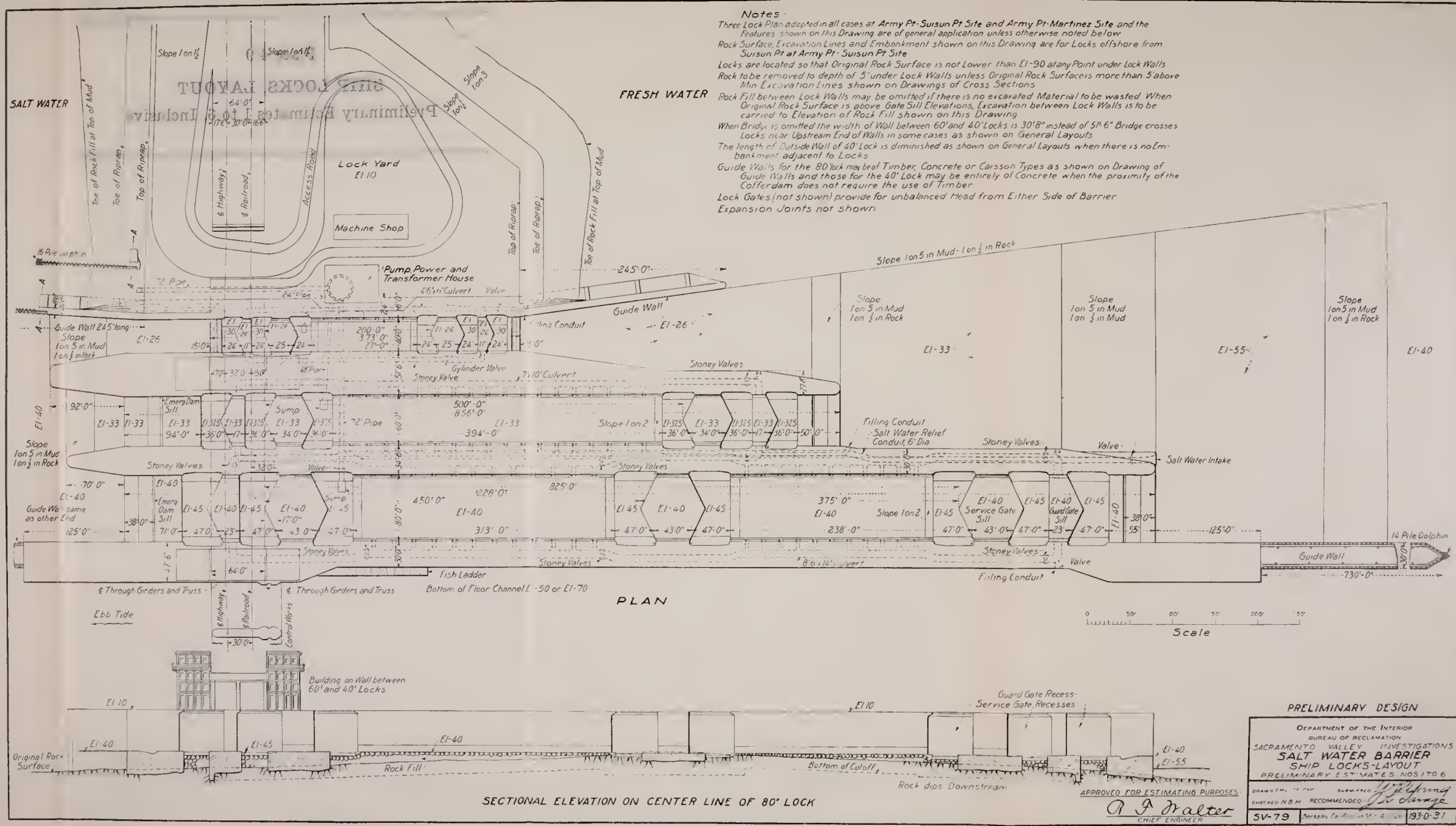
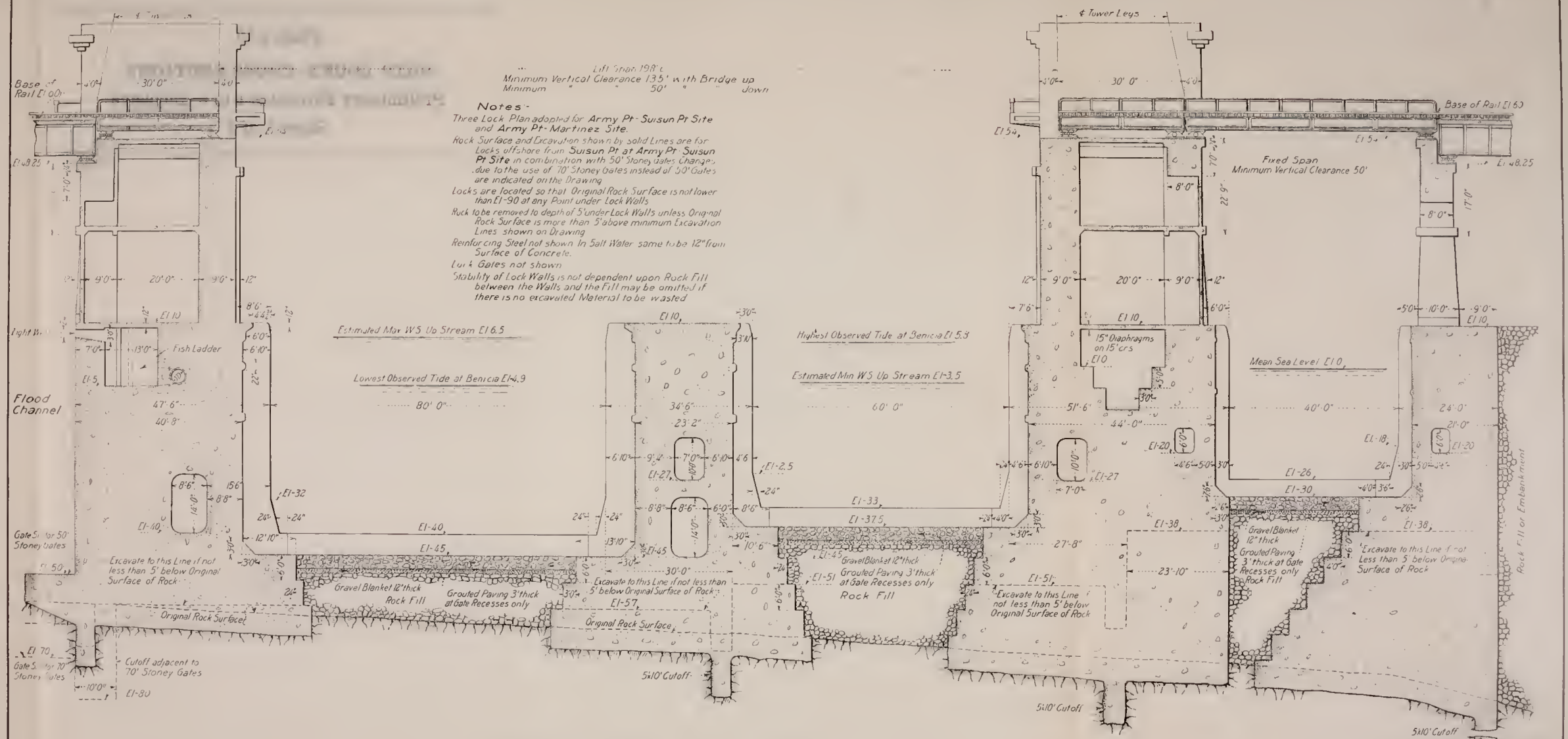

Notes
Three Lock Plan adopted in all cases at Army Pt-Suisun Pt Site and Army Pt-Martinez Site and the Features shown on this Drawing are of general application unless otherwise noted below
Rock Surface, Excavation Lines and Embankment shown on this Drawing are for Locks offshore from Suisun Pt at Army Pt-Suisun Pt Site
Locks are located so that Original Rock Surface is not Lower than El-90 at any Point under Lock Walls
Rock to be removed to depth of 5' under Lock Walls unless Original Rock Surface is more than 5' above Min Excavation Lines shown on Drawings of Cross Sections
Rock Fill between Lock Walls may be omitted if there is no excavated Material to be wasted When Original Rock Surface is above Gate Sill Elevations, Excavation between Lock Walls is to be carried to Elevation of Rock Fill shown on this Drawing
When Bridge is omitted the width of Wall between 60' and 40' Locks is 30'8" instead of 51'6" Bridge crosses Locks near Upstream End of Walls in some cases as shown on General Layouts
The length of Outside Wall of 40' Lock is diminished as shown on General Layouts when there is no Embankment adjacent to Locks
Guide Walls for the 80' lock may be of Timber, Concrete or Carsson Types as shown on Drawing of Guide Walls and those for the 40' Lock may be entirely of Concrete when the proximity of the Cofferdam does not require the use of Timber
Lock Gates (not shown) provide for unbalanced Head from Either Side of Barrier
Expansion Joints not shown
SALT WATER
FRESH WATER
Slope 1 on 1½
Slope 1 on 3
Slope 1 on 2
Toe of Rock Fill at Top of Mud
Toe of Riprap
Top of Riprap
℄ Highway
℄ Railroad
Access Road
Lock Yard El 10
Machine Shop
16 Pile Dolphin
Pump, Power and Transformer House
72" Pipe
24" Pipe
4'6"x11' Culvert
Valve
Guide Wall 245' long
Slope 1 on 5 in Mud 1 on ½ in Rock
Guide Wall
El-26
Filling Conduit
Cylinder Valve
Stoney Valve
7'x10' Culvert
48" Pipe
Slope 1 on 5 in Mud 1 on ½ in Mud
El-33
El-55
El-40
Emerg Dam Sill
Sump
Stoney Valves
Slope 1 on 2
Salt Water Relief Conduit, 6' Dia
Valve
Salt Water Intake
Guide Wall same as other End
Service Gate Sill
Guard Gate Sill
14 Pile Dolphin
Fish Ladder
Bottom of Floor Channel El -50 or El -70
℄ Through Girders and Truss
PLAN
Ebb Tide
Scale
Building on Wall between 60' and 40' Locks
Guard Gate Recess
Service Gate Recesses
Original Rock Surface
Rock Fill
Bottom of Cutoff
Rock dips Downstream
SECTIONAL ELEVATION ON CENTER LINE OF 80' LOCK
PRELIMINARY DESIGN
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS
SALT WATER BARRIER
SHIP LOCKS-LAYOUT
PRELIMINARY ESTIMATES NOS 1 TO 6
APPROVED FOR ESTIMATING PURPOSES
A. A. Walter
CHIEF ENGINEER
SV-79
1930-31

Plate 4-10

SHIP LOCKS, CROSS SECTIONS

Preliminary Estimates 1 to 6, Inclusive

Sheet 1 of 2


Lift Span 198'c
Minimum Vertical Clearance 135' with Bridge up
Minimum " " 50' " " Down
Notes -
Three Lock Plan adopted for Army Pt - Suisun Pt Site and Army Pt - Martinez Site.
Rock Surface and Excavation shown by solid Lines are for Locks offshore from Suisun Pt at Army Pt - Suisun Pt Site in combination with 50' Stoney Gates Changes due to the use of 70' Stoney Gates instead of 50' Gates are indicated on the Drawing
Locks are located so that Original Rock Surface is not lower than El-90 at any Point under Lock Walls
Rock to be removed to depth of 5' under Lock Walls unless Original Rock Surface is more than 5' above minimum Excavation Lines shown on Drawing
Reinforcing Steel not shown In Salt Water same to be 12" from Surface of Concrete.
Lock Gates not shown
Stability of Lock Walls is not dependent upon Rock Fill between the Walls and the Fill may be omitted if there is no excavated Material to be wasted
Base of Rail El 60
Base of Rail El 60
Fixed Span
Minimum Vertical Clearance 50'
Flood Channel
Fish Ladder
Estimated Max WS Up Stream El 6.5
Lowest Observed Tide at Benicia El-4.9
Highest Observed Tide at Benicia El 5.3
Estimated Min WS Up Stream El-3.5
Mean Sea Level El 0
15" Diaphragms on 15' crs
Gate Sill for 50' Stoney Gates
Gate Sill for 70' Stoney Gates
Excavate to this Line if not less than 5' below Original Surface of Rock
Gravel Blanket 12" thick
Rock Fill
Grouted Paving 3' thick at Gate Recesses only
Original Rock Surface
Cutoff adjacent to 70' Stoney Gates
5x10' Cutoff
Grouted Paving 3' thick at Gate Recesses only
Rock Fill or Embankment

SECTION AT BRIDGE AND GATE RECESSES

Scale

PRELIMINARY DESIGN

DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS
SALT WATER BARRIER
SHIP LOCKS - CROSS SECTIONS
PRELIMINARY ESTIMATES NOS 1 TO 6

APPROVED FOR ESTIMATING PURPOSES
A. F. Walter
CHIEF ENGINEER

DRAWN SUBMITTED J. L. Savage
CHECKED RECOMMENDED J. L. Savage

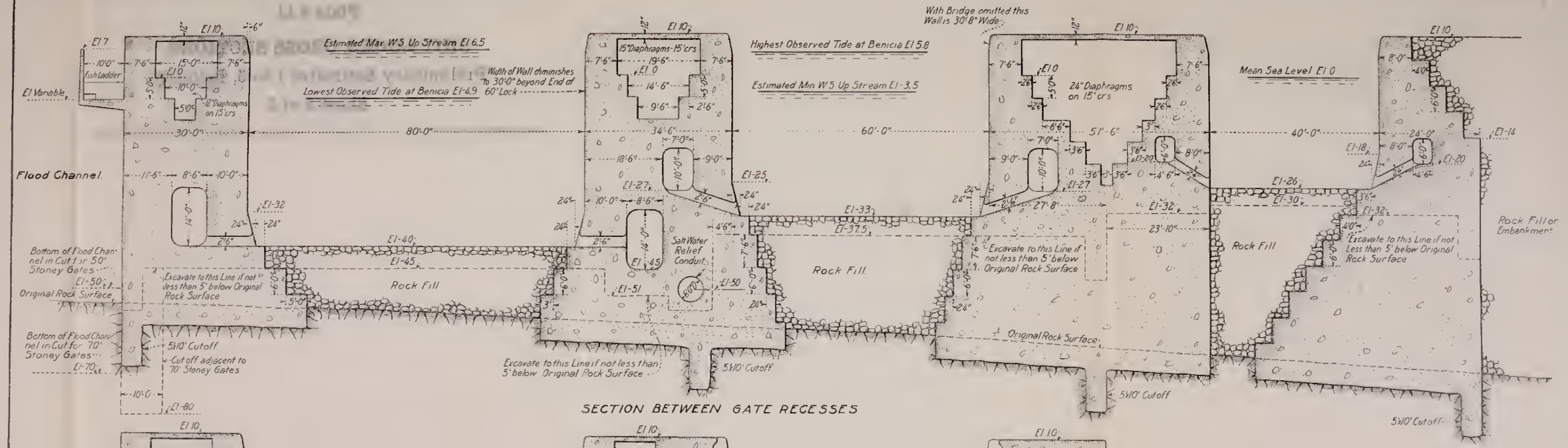
SV-80 193-D-32

Plate 4-11

SHIP LOCKS, CROSS SECTIONS

Preliminary Estimates 1 to 6, Inclusive

Sheet 2 of 2


Estimated Max W.S. Up Stream El 6.5
Lowest Observed Tide at Benicia El -4.9
Width of Wall diminishes To 30'-0" beyond End of 60' Lock
Highest Observed Tide at Benicia El 5.8
Estimated Min W.S. Up Stream El -3.5
With Bridge omitted this Wall is 30'-8" Wide
Mean Sea Level El 0
Flood Channel
Fish Ladder
El Variable
12" Diaphragms on 15' crs
15" Diaphragms 15' crs
24" Diaphragms on 15' crs
Salt Water Relief Conduit
Rock Fill
Rock Filler Embankment
Bottom of Flood Channel in Cut for 50' Stoney Gates
Bottom of Flood Channel in Cut for 70' Stoney Gates
Original Rock Surface
Excavate to this Line if not less than 5' below Original Rock Surface
5'x10' Cutoff
Cut off adjacent to 70' Stoney Gates
SECTION BETWEEN GATE RECESSES
Approach to 40' Lock
Gate Recesses
Grouted Paving 3" thick
Gravel Blanket 12" thick
Rock Fill
SECTION BEYOND 40' LOCK

Notes:-

- Three Lock Plan adopted for Army Pt - Suisun Pt Site and Army Pt - Martinez Site
- Rock Surface and Excavation shown by solid Lines are for Locks offshore from Suisun Pt at Army Pt - Suisun Pt Site in combination with 50' Stoney Gates Changes due to the use of 70' Stoney Gates instead of 50' Gates are indicated on the Drawing
- Locks are located so that Original Rock Surface is not lower than El -90 at any Point under Lock Walls
- Rock to be removed to depth of 5' under Lock Walls unless Original Rock Surface is more than 5' above minimum Excavation Lines shown on Drawing
- Reinforcing Steel not shown In Salt Water same to be 12" from Surface of Concrete
- Lock Gates not shown
- Stability of Lock Walls is not dependent upon Rock Fill between the Walls and the Fill may be omitted if there is no excavated Material to be wasted

Scale

PRELIMINARY DESIGN

APPROVED FOR ESTIMATING PURPOSES

R. F. Walter

CHIEF ENGINEER

DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS
SALT WATER BARRIER
SHIP LOCKS - CROSS SECTIONS
PRELIMINARY ESTIMATES NOS. 1 TO 6

DRAWN C.M. TRACED SUBMITTED G.H. Tilton
CHECKED N.B.M. RECOMMENDED G.L. Savage

SV-81 | Serial No. Sacto. 1941 Sheet 2 of 2 | 1940-33

Plate 4-12

SHIP LOCKS, JUNCTION WITH CONTROL WORKS

Notes:-

This Drawing shows Junction of Control Works for 50' Stoney Gates and 80' Lock when Bridge is near Downstream End of Lock Wall With Control Works for either 50' or 70' Stoney Gates adjoining 90' or 110' Lock and Bridge near either End of Lock Wall, the arrangement is substantially the same

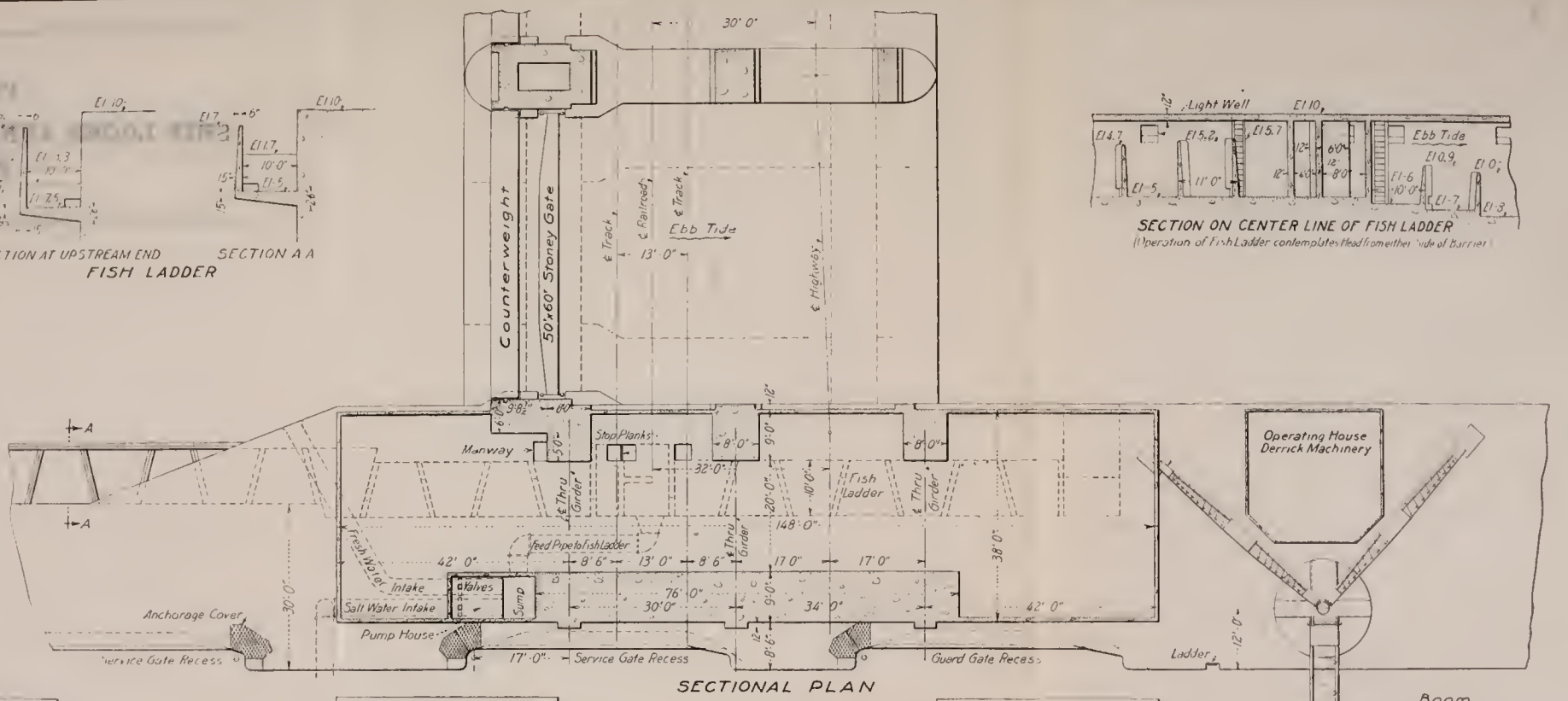
Reinforcing Steel not shown. In Salt Water surface to be 12" from Surface of Concrete

SECTION AT UPSTREAM END — SECTION A A

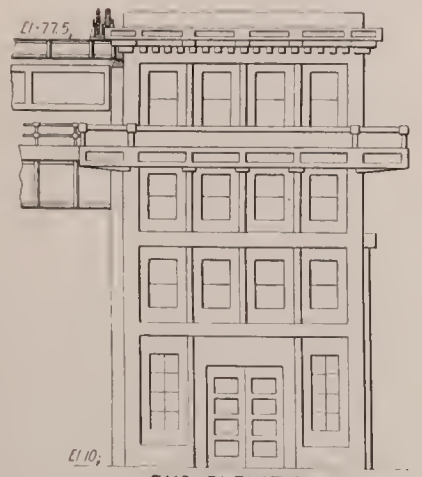
FISH LADDER

SECTION ON CENTER LINE OF FISH LADDER

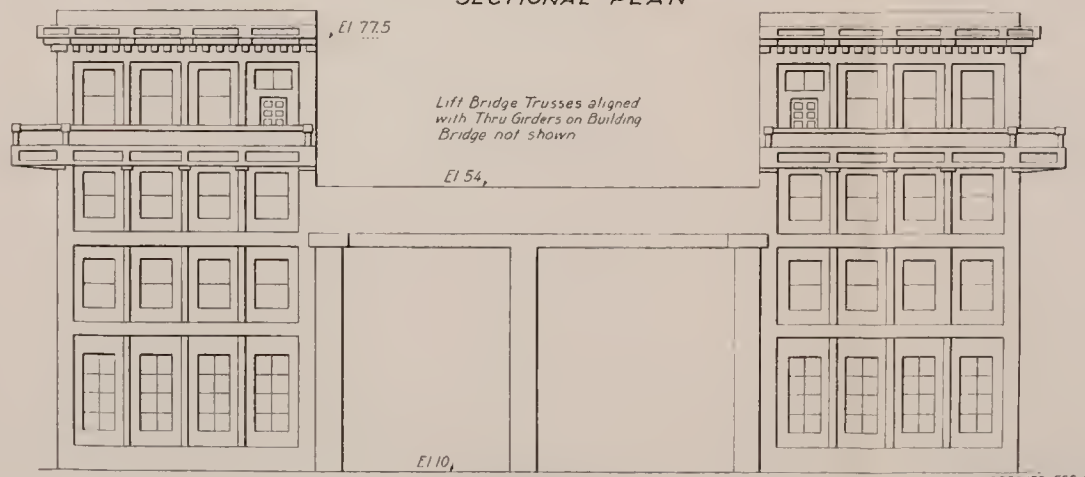
(Operation of Fish Ladder contemplates Head from either side of Barrier)



SECTIONAL PLAN



END ELEVATION



SIDE ELEVATION

Boom

Length	100 ft
Capacity	
Main Blocks	150,000 lbs
Auxiliary Blocks	34,000 "

Scale

PRELIMINARY DESIGN

APPROVED FOR ESTIMATING PURPOSES

A. P. Walter
CHIEF ENGINEER

DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS
SALT WATER BARRIER
SHIP LOCKS
JUNCTION WITH CONTROL WORKS

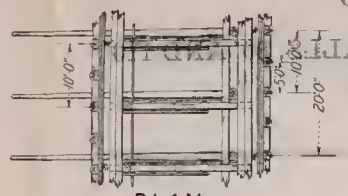
DRAWN ABH-LTF-CSM SUBMITTED W.W. Harvey
CHECKED NBH RECOMMENDED J.W. Dorsey

SV-82 | Berkeley, California Feb 23 1936 | 193-D-34

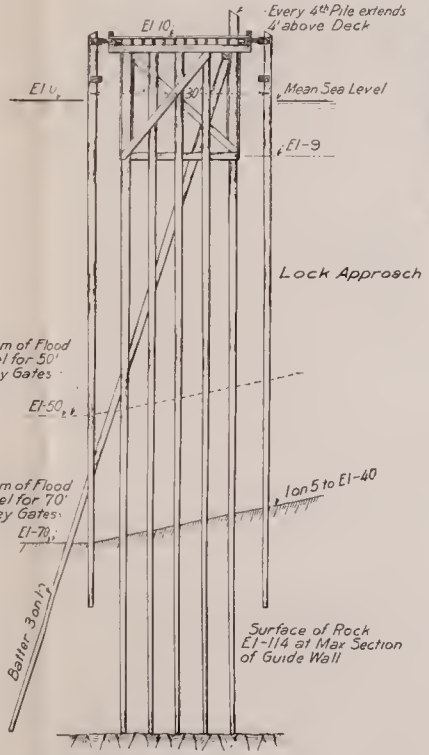
Plate 4-13

SHIP LOCKS, GUIDE WALLS, 80′ AND 110′ LOCKS

Notes:-
Guide Walls shown on this Drawing to be used with either the 80 Lock or the 110' Lock
Top of Wall is at El 12 at Pt San Pablo Site and at El 10 at other Sites
Reinforcing Steel not shown in Salt Water, same to be 12" from Surface of Concrete

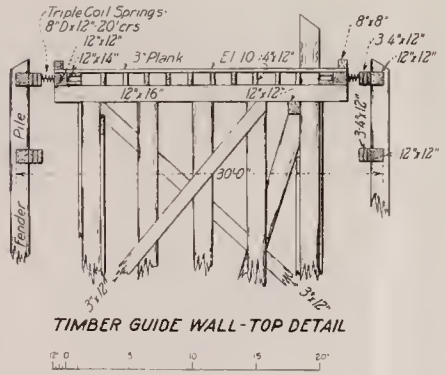


PLAN
(Floor and Stringers removed)



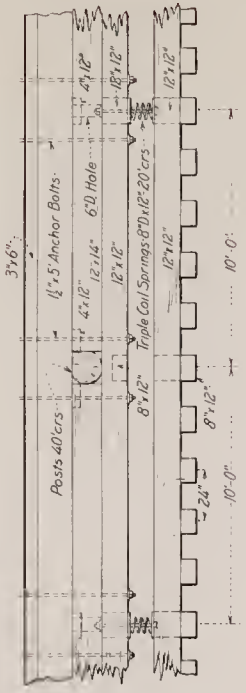
TIMBER GUIDE WALL
TYPICAL SECTION

Scale

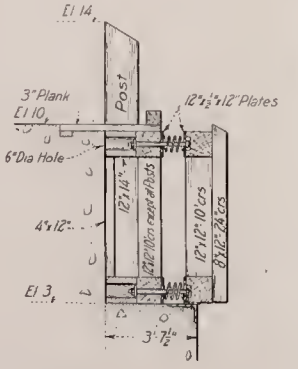


TIMBER GUIDE WALL-TOP DETAIL

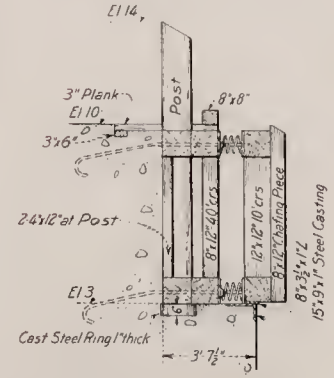
Scale



PLAN
(Plank and Guard Timber Removed)



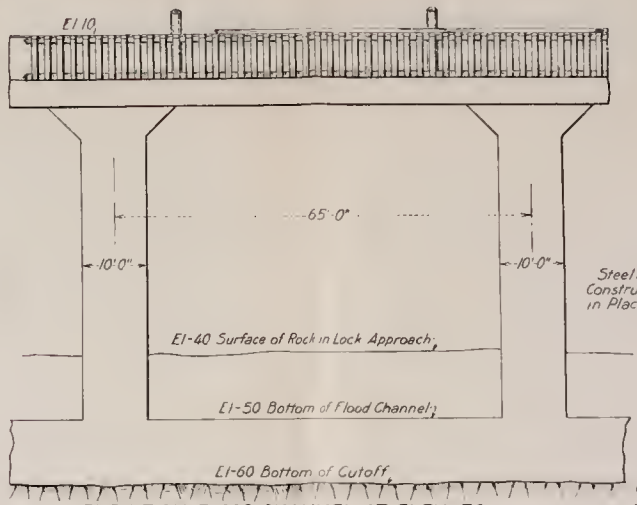
SECTION AT COIL SPRINGS



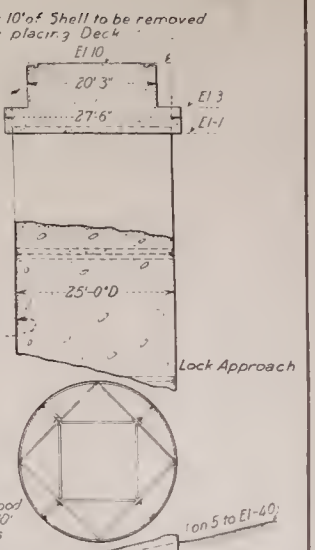
SECTION AT MOORING POST

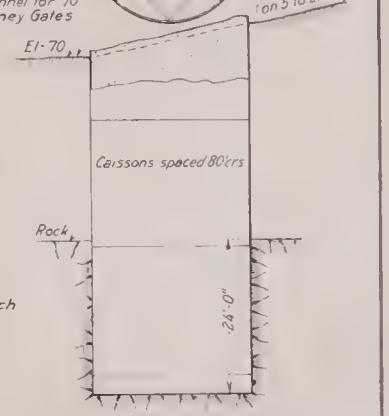
FENDER DETAILS
(For Concrete and Caisson Type Guide Walls)

Scale



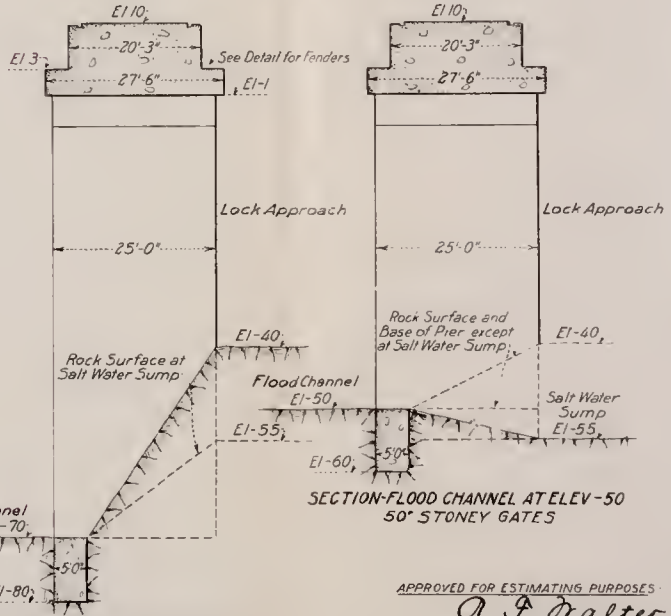
ELEVATION-FLOOD CHANNEL AT ELEV-50
50' STONEY GATES





CAISSON TYPE GUIDE WALL
TYPICAL SECTION

Scale



SECTION-FLOOD CHANNEL AT ELEV-50
50' STONEY GATES

SECTION-FLOOD CHANNEL AT ELEV-70
70' STONEY GATES

CONCRETE GUIDE WALL

APPROVED FOR ESTIMATING PURPOSES:
A. D. Walter
CHIEF ENGINEER

PRELIMINARY DESIGN

DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS
SALT WATER BARRIER
SHIP LOCKS
GUIDE WALLS-80' AND 110' LOCKS

DRAWN A.S.P. CHD. SUBMITTED J.C. Stevens
CHECKED N.B.H. RECOMMENDED J.L. Savage

SV-83 | Revised, to form fed 27 926 | 153-D-35

Plate 4-14

ARMY POINT SITE, GENERAL LAYOUT

Preliminary Estimate No. 2

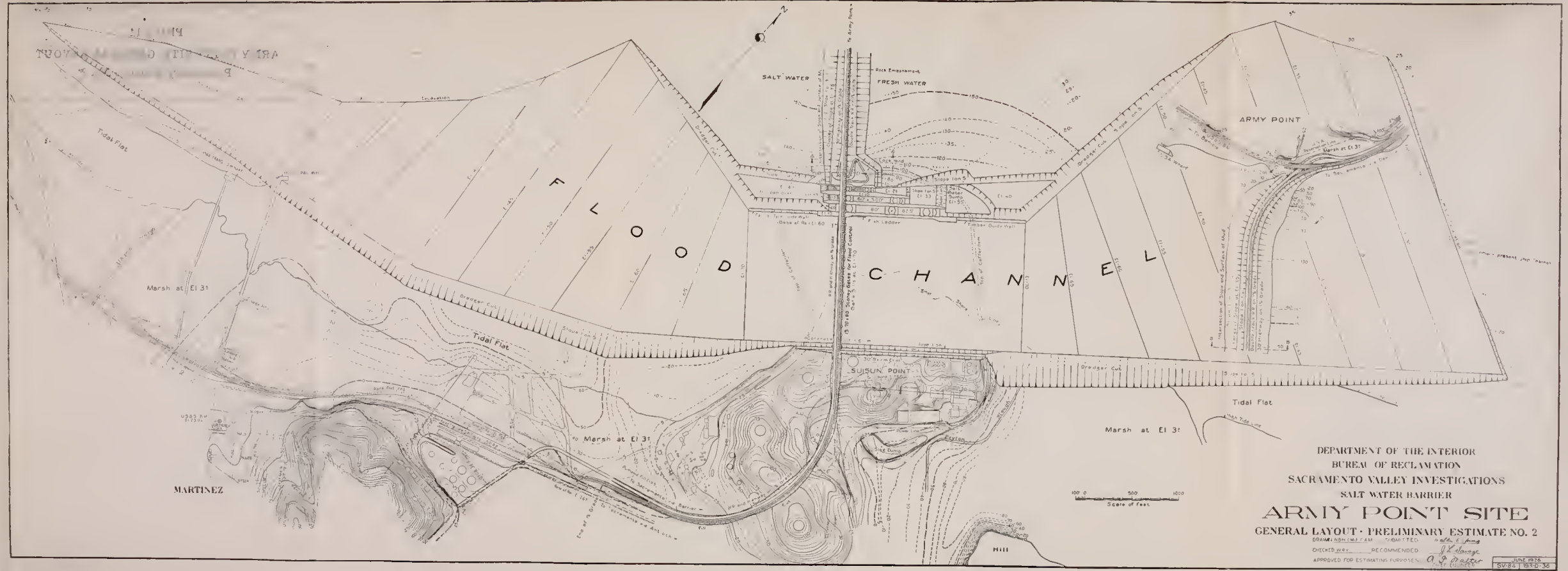
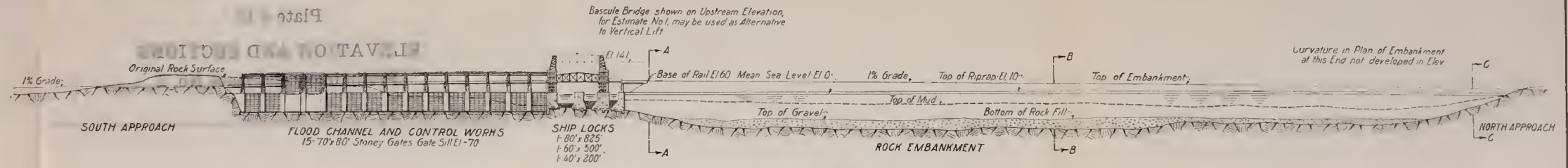

SALT WATER
FRESH WATER
Rock Embankment
FLOOD CHANNEL
ARMY POINT
SUISUN POINT
Tidal Flat
Marsh at El 3±
Dredger Cut
Slope 1on5
Fish Ladder
Timber Guide Wall
Water Sump El -55
Hill
MARTINEZ
Scale of Feet
100 0 500 1000
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS
SALT WATER BARRIER
ARMY POINT SITE
GENERAL LAYOUT - PRELIMINARY ESTIMATE NO. 2
DRAWN WITH CMU FAM SUBMITTED
CHECKED WEY RECOMMENDED
APPROVED FOR ESTIMATING PURPOSES
JUNE 1976
SV-84 | 8370-36

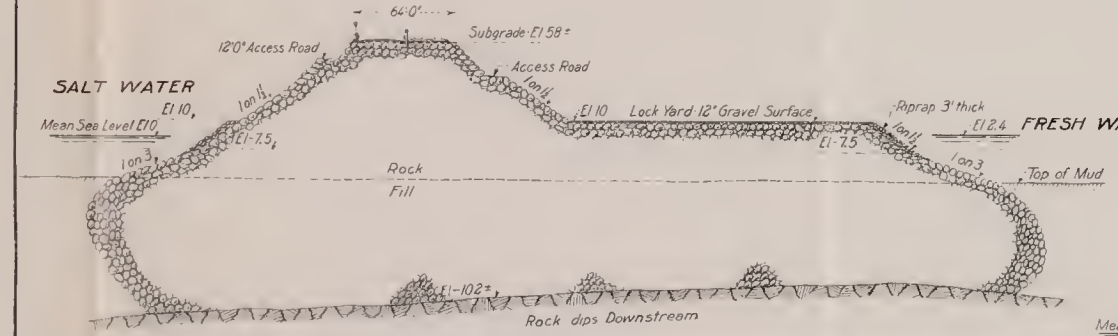
Plate 4-15

ELEVATION AND SECTIONS

Preliminary Estimate No. 2

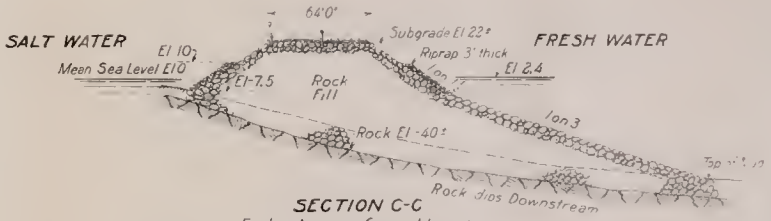


UPSTREAM ELEVATION

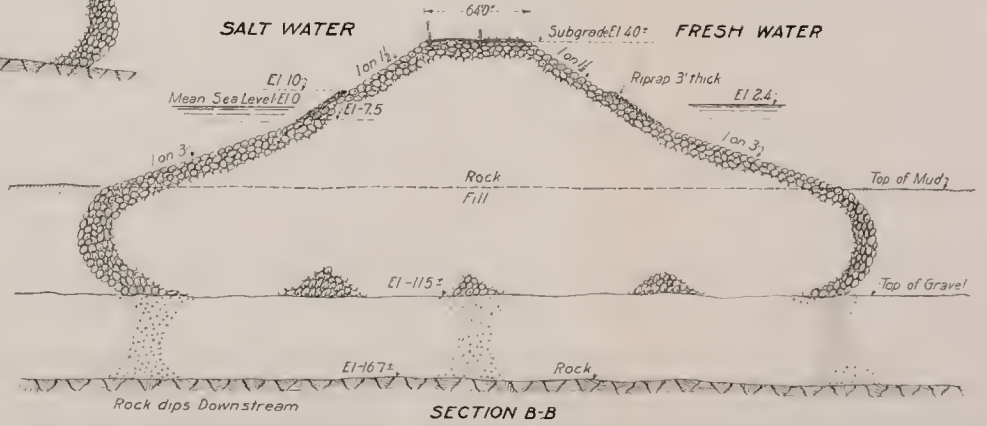


SECTION A-A

Notes:
Rock Fill to be placed by Bottom Dump Barges up to maximum Elevation permitted by Draft Remainder to be placed by Derrick Barges and Skips



SECTION C-C
For Location see General Layout for Estimate N°2



SECTION B-B

EMBANKMENT SECTIONS

Scale

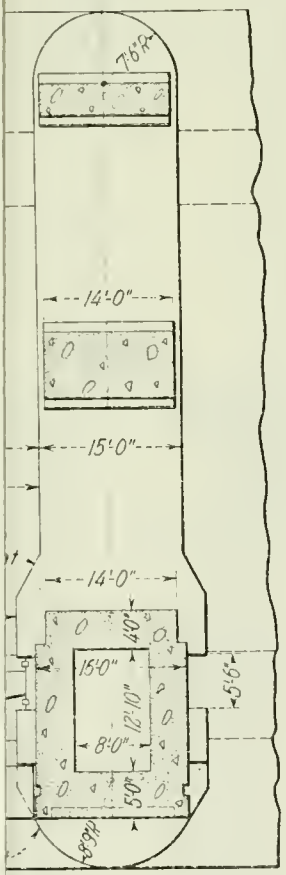
PRELIMINARY DESIGN

DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS
SALT WATER BARRIER
ELEVATION AND SECTIONS
PRELIMINARY ESTIMATE NO 2

DRAWN C.M.U.
TRACED J.C.Y. C.A.M.
CHECKED N.B.H.
SUBMITTED W.P. Kearney
RECOMMENDED O.H. Ranger

APPROVED FOR ESTIMATING PURPOSES
R. P. Walter
CHIEF ENGINEER

SV-85 | Berkeley, California Mch 20 1936 | 193-D-37

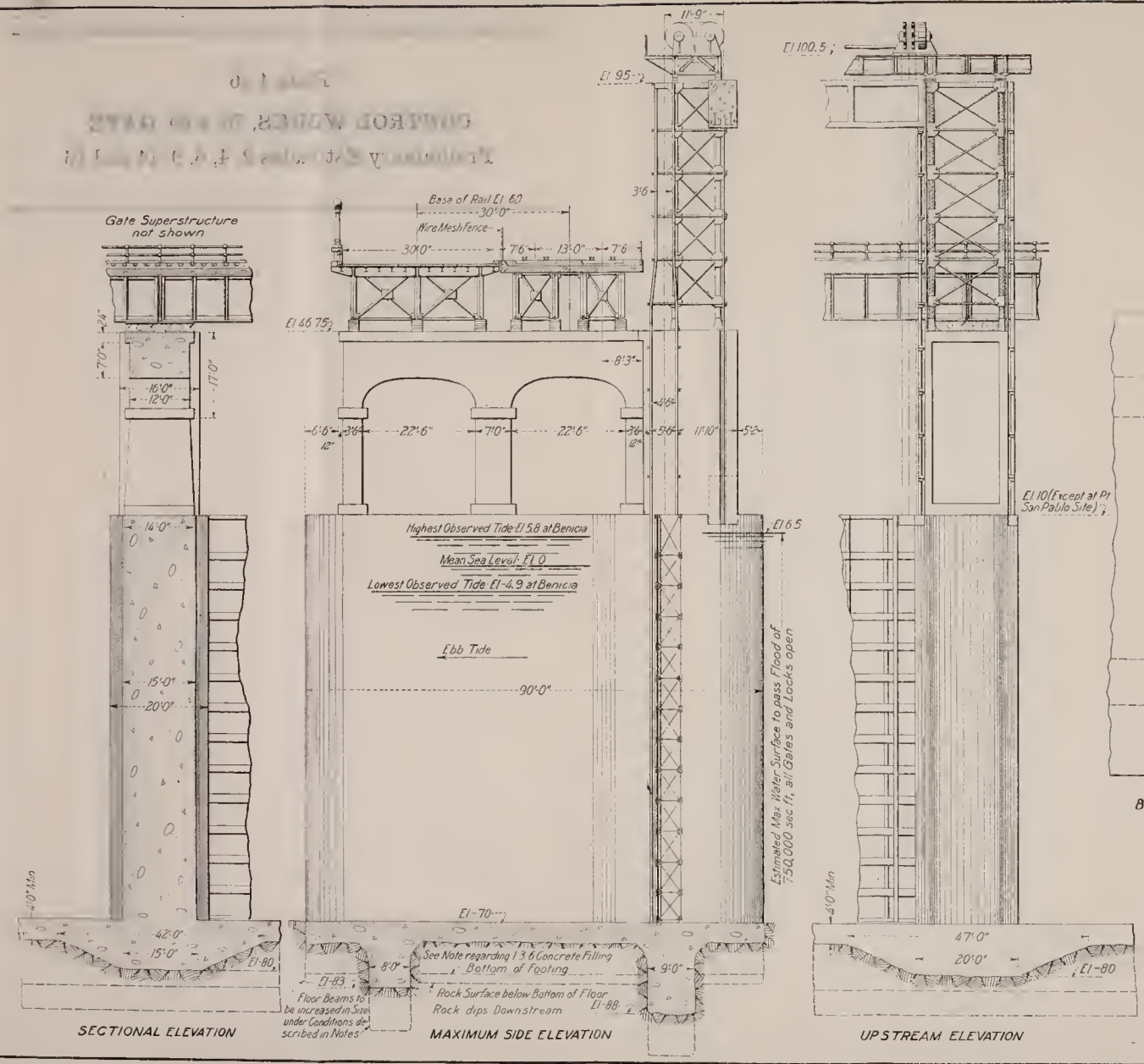


SECTION AT EL. 10

ELIMINARY DESIGN

DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
NTO VALLEY INVESTIGATIONS
LT WATER BARRIER
OL WORKS-70'x80' GATE
RY ESTIMATES Nos 2, 4, 6, 9, 14 AND 16

SUBMITTED
RECOMMENDED


Gate Superstructure not shown
Base of Rail El. 60
30'0"
Wire Mesh Fence
El. 95
El. 100.5
El. 46.75
Highest Observed Tide El. 5.8 at Benicia
Mean Sea Level El. 0
Lowest Observed Tide El. -4.9 at Benicia
Ebb Tide
90'0"
El. 65
El. 10 (Except at Pt. San Pablo Site)
Estimated Max. Water Surface to pass Flood of 150,000 sec. ft. all Gates and Locks open
El. -70
See Note regarding 1:3:6 Concrete Filling Bottom of Footing
Rock Surface below Bottom of Floor
Rock dips Downstream
El. -88
Floor Beams to be increased in Size under Conditions described in Notes
El. -83
El. -80
42'0"
47'0"
20'0"
SECTIONAL ELEVATION
MAXIMUM SIDE ELEVATION
UPSTREAM ELEVATION

Notes:-

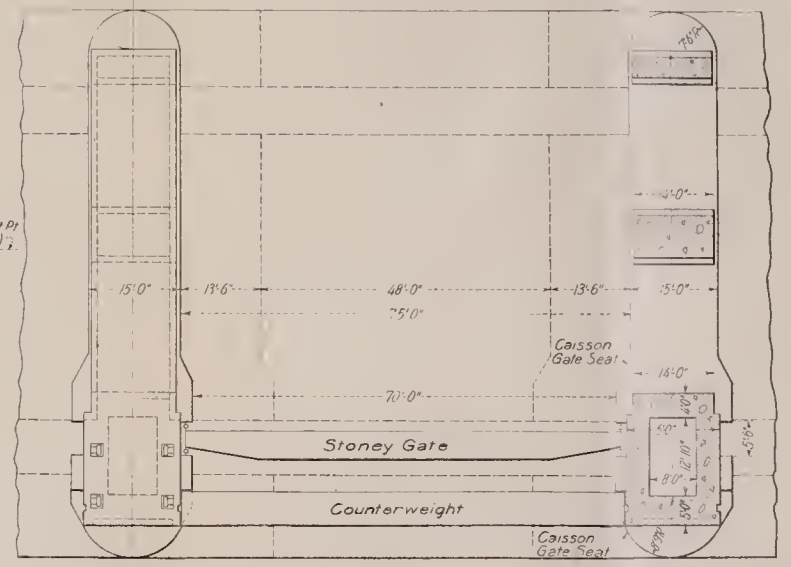
At Pt San Pablo Site the Top of Substructure is at El 12 instead of El 10. Other Elevations do not change

When there is no Railroad or Highway Bridge, the Length of Substructure Piers is diminished from 90' to 65'

Reinforcing Steel not shown. In Salt Water, Same to be 12" from Surface of Concrete

Where Original Surface of Rock is slightly below Bottom of Floor the Latter is to be thickened but where appreciably below, the Space between Floor, Rock Surface and Floor Beams is filled with 1:3:6 Concrete and Floor Beams are widened and deepened to retain same penetration in Rock. See dotted Lines on Side Elevation

Superstructure for 70'x80' Stoney Gate is similar to that shown in Detail for 50'x60' Gate.



Scale

PRELIMINARY DESIGN

DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS
SALT WATER BARRIER
CONTROL WORKS-70'x80' GATE
PRELIMINARY ESTIMATES Nos. 2, 4, 6, 9, 14 AND 16

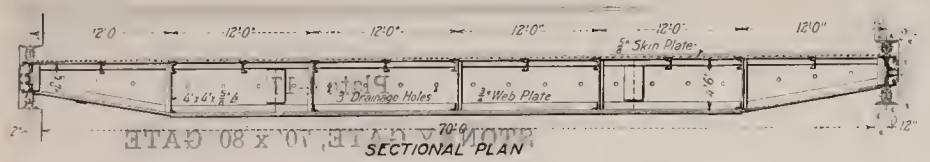
DRAWN
TRACED JFY
CHECKED NBH
SUBMITTED
RECOMMENDED

APPROVED FOR ESTIMATING PURPOSES
A. P. Walter
CHIEF ENGINEER

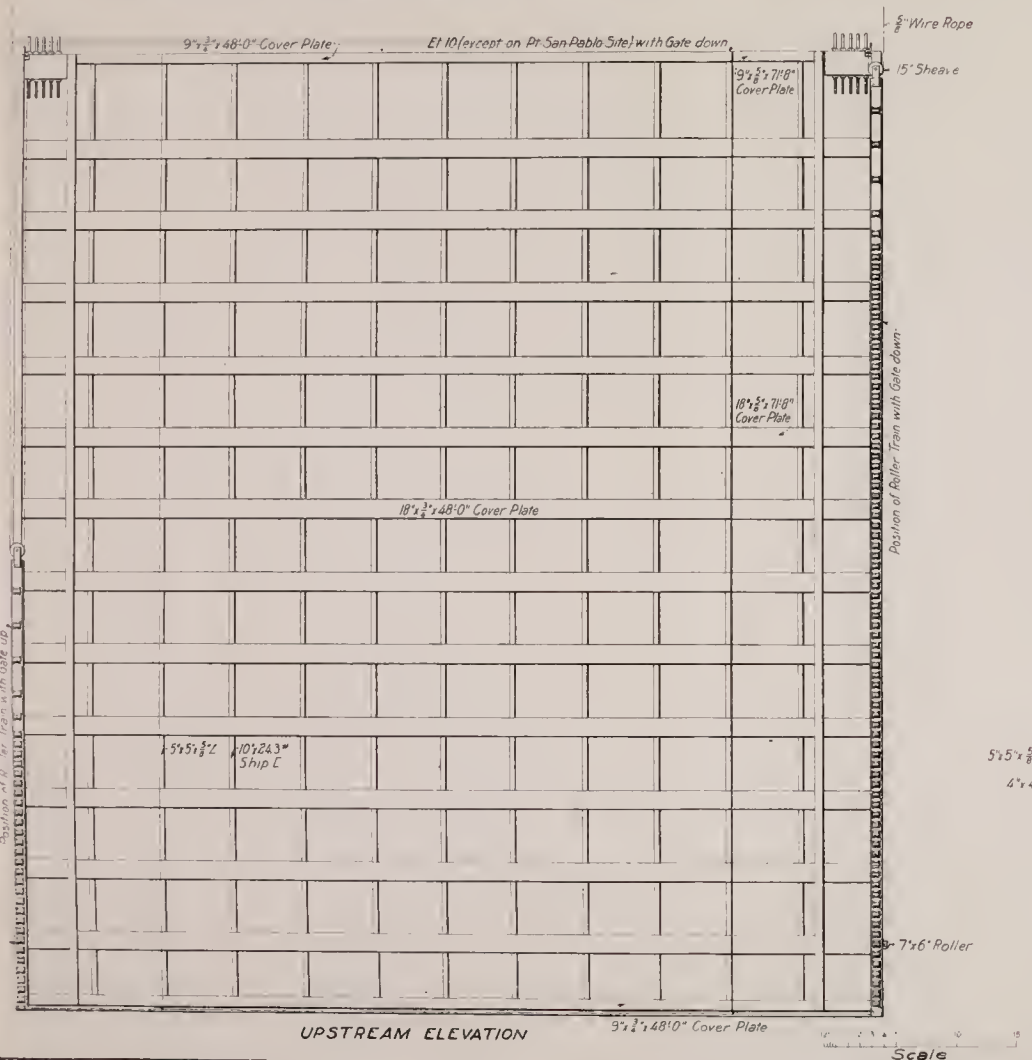
SV-86 | 193-D-38

Plate 4-17

STONEY GATE, 70′ x 80′ GATE

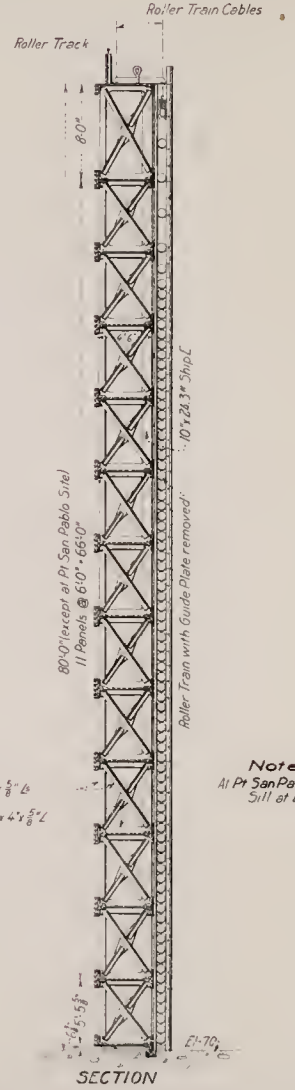


SECTIONAL PLAN

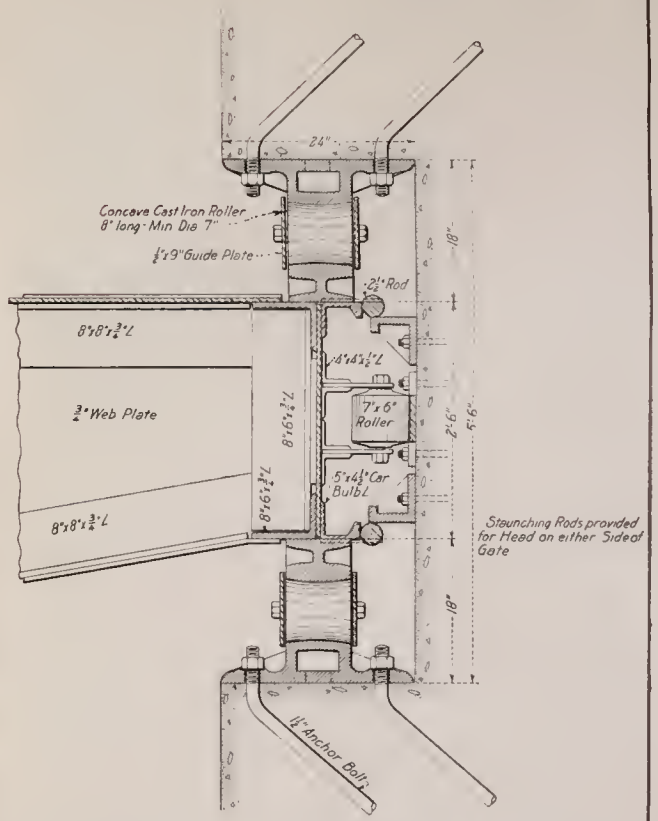

9"x 3/4"x 48'0" Cover Plate
El 10 (except on Pt San Pablo Site) with Gate down
5/8" Wire Rope
15" Sheave
9"x 5/8"x 7'8" Cover Plate
18"x 5/8"x 7'8" Cover Plate
18"x 3/4"x 48'0" Cover Plate
Position of Roller Train with Gate down
Position of Roller Train with Gate up
5"x 5"x 5/8" L
10"x 24.3" Ship C
7"x 6" Roller
9"x 3/4"x 48'0" Cover Plate

UPSTREAM ELEVATION

Scale



SECTION



END DETAILS

Scale

Notes

At Pt San Pablo Site Top of Gate when down is at El 12 Gate Sill at El -70 at all Sites

PRELIMINARY DESIGN

DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS
SALT WATER BARRIER
70'x 80' STONEY GATE
GATE SILL ELEVATION -70

DRAWN C.M.J.-J.E.V.-C.A.M. SUBMITTED
CHECKED V.B.M. RECOMMENDED

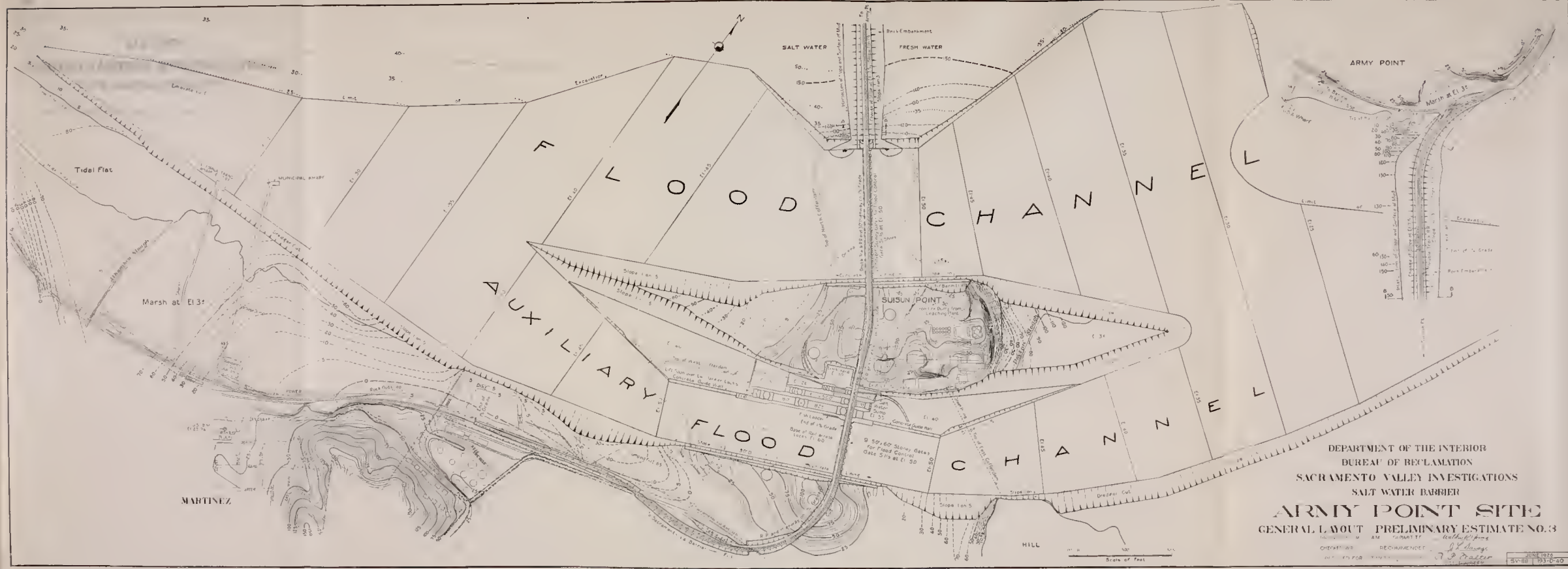
APPROVED FOR ESTIMATING PURPOSES
A. P. Walter
CHIEF ENGINEER

SV-87 | Berkeley, California March 3, 1926 | 1930-39

Plate 4-18

ARMY POINT SITE, GENERAL LAYOUT

Preliminary Estimate No. 3



DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS
SALT WATER BARRIER

ARMY POINT SITE

GENERAL LAYOUT PRELIMINARY ESTIMATE NO. 3

DRAWN AM TRACED TT Withdrawing

CHECKED RECOMMENDED J. P. Savage

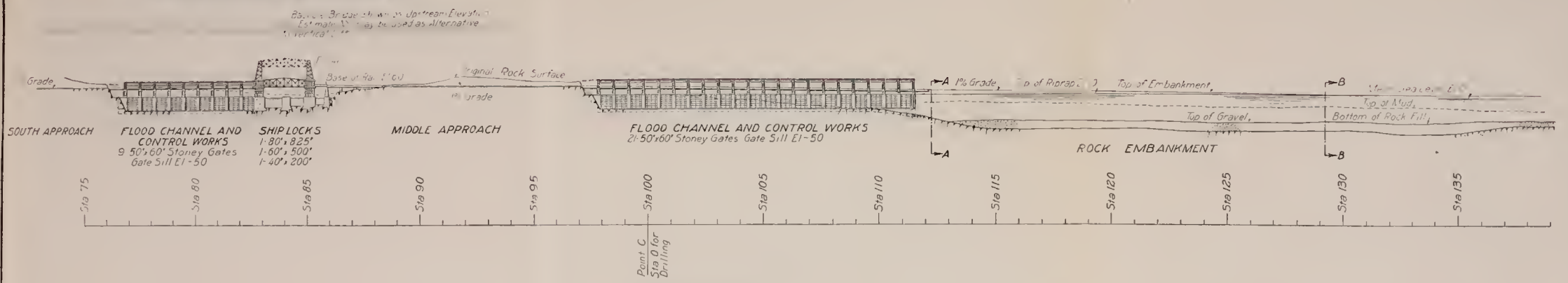
DESIGN FOR Project Manager

JUNE 1926
SV-88 193-D-40

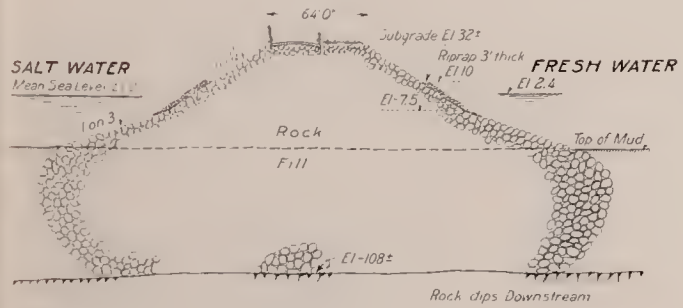
Plate 4-19

ELEVATION AND SECTIONS

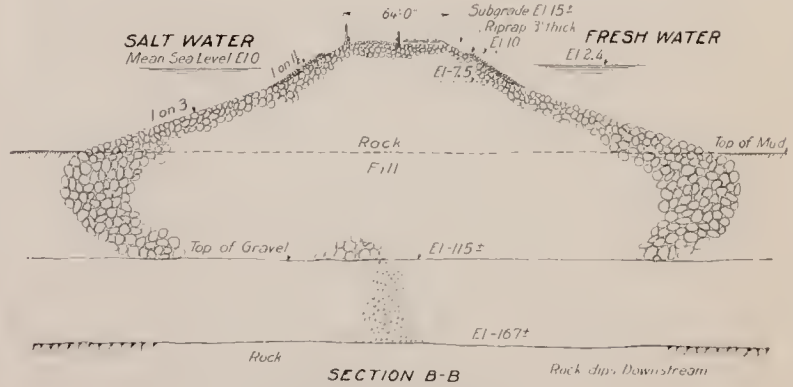
Preliminary Estimate No. 3



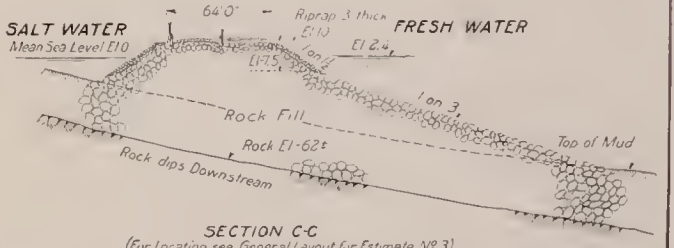
UPSTREAM ELEVATION
(Developed)



SECTION A-A



SECTION B-B



SECTION C-C
(For Location see General Layout for Estimate No 3)

EMBANKMENT SECTIONS

Scale

Notes:
Rock Fill to be placed by Bottom Dump Barges up to Maximum Elevation permitted by draft Remainder to be placed by Derrick Barges and Skips

PRELIMINARY DESIGN

APPROVED FOR ESTIMATING PURPOSES
A. P. Drafter
CHIEF ENGINEER

DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS
SALT WATER BARRIER
ELEVATION AND SECTIONS
PRELIMINARY ESTIMATE NO 3

DRAWN CM AM SUBMITTED W. F. Kelly
CHECKED NBH RECOMMENDED C. L. Savage

SV-89 | Ellensburg, Wash. June 2 1926 | 193-D-41

Plate 4-20

ARMY POINT SITE, GENERAL LAYOUT

Preliminary Estimate No. 4

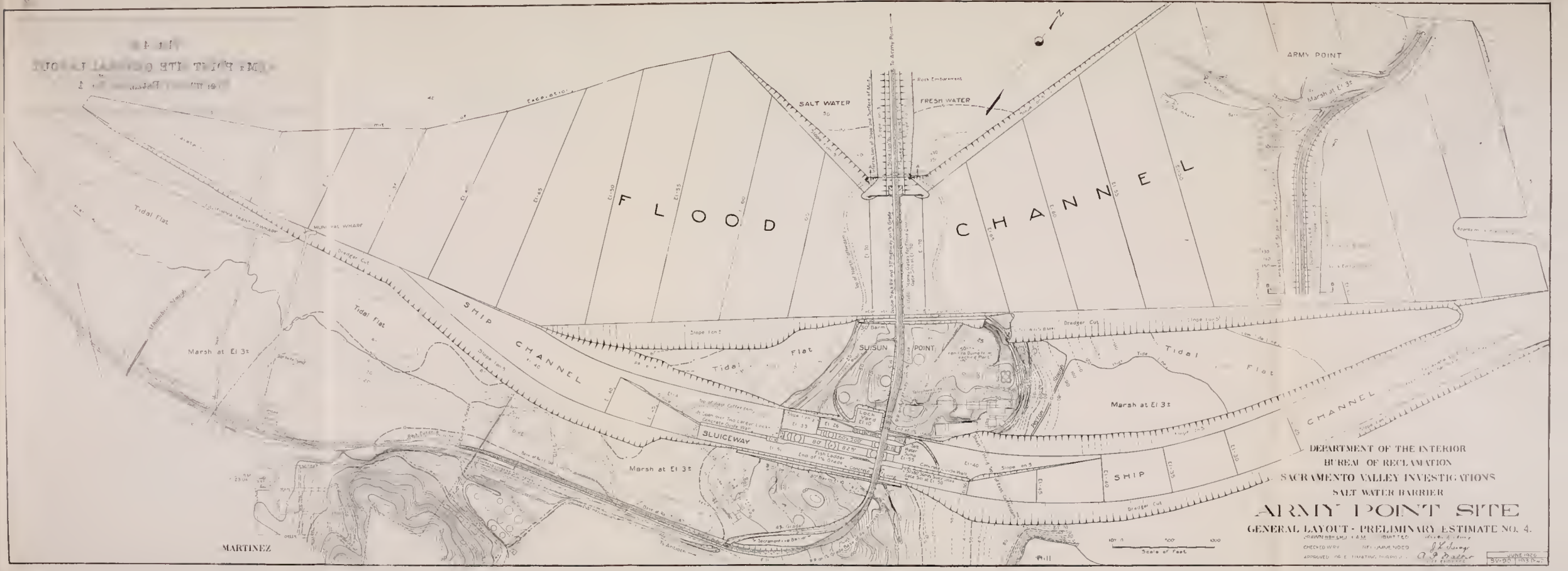
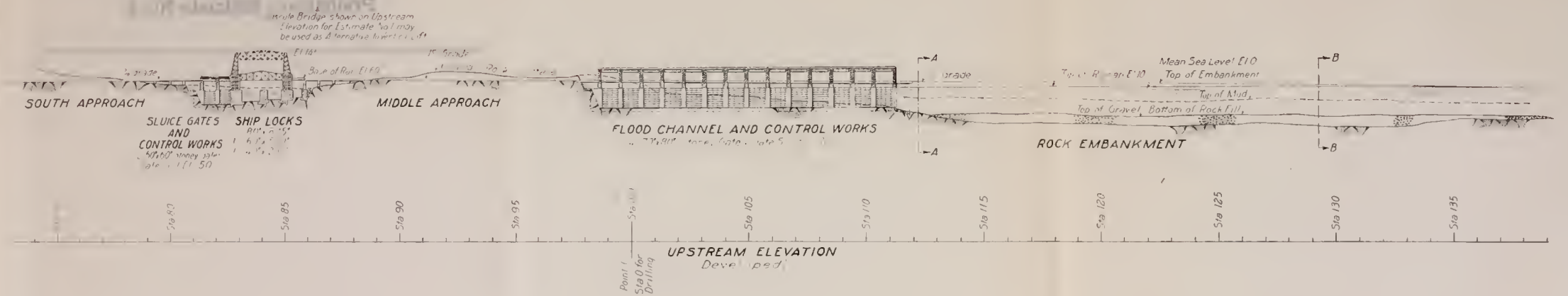
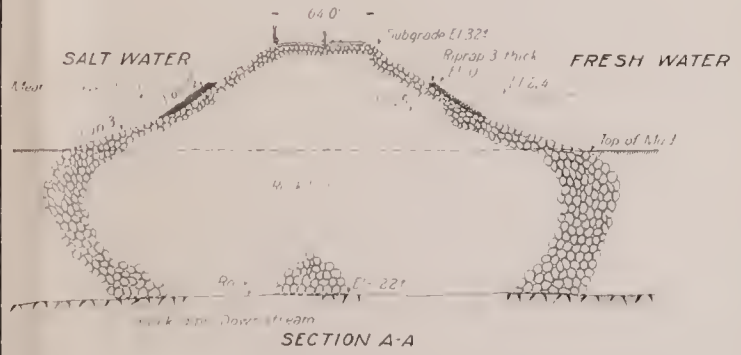

FLOOD CHANNEL
SALT WATER
FRESH WATER
ARMY POINT
Marsh at El 3±
Tidal Flat
SHIP CHANNEL
SUISUN POINT
SLUICEWAY
SHIP
MARTINEZ
Scale of Feet
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS
SALT WATER BARRIER
ARMY POINT SITE
GENERAL LAYOUT - PRELIMINARY ESTIMATE NO. 4.

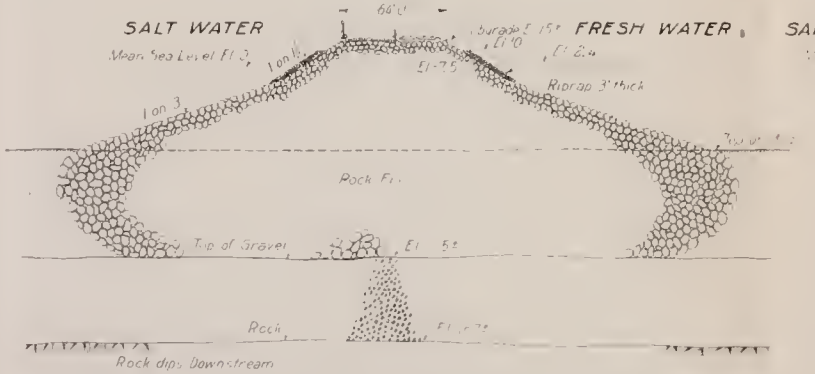
Plate 4-21

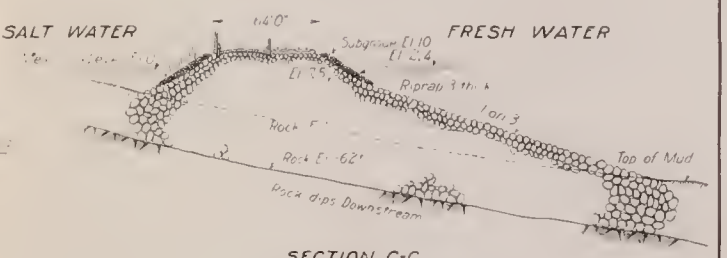
ELEVATION AND SECTIONS

Preliminary Estimate No. 4









EMBANKMENT SECTIONS

Scale

Notes:
Rock Fill to be placed by Bottom Dump Barges up to Maximum Elevation permitted by draft
Remainder to be placed by Derrick Barges and Skips

PRELIMINARY DESIGN

DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS
SALT WATER BARRIER
ELEVATION AND SECTIONS
PRELIMINARY ESTIMATE NO 4

DRAWN C.M. SUBMITTED W.L. Herring
CHECKED N.G.H. RECOMMENDED A.E. Savage

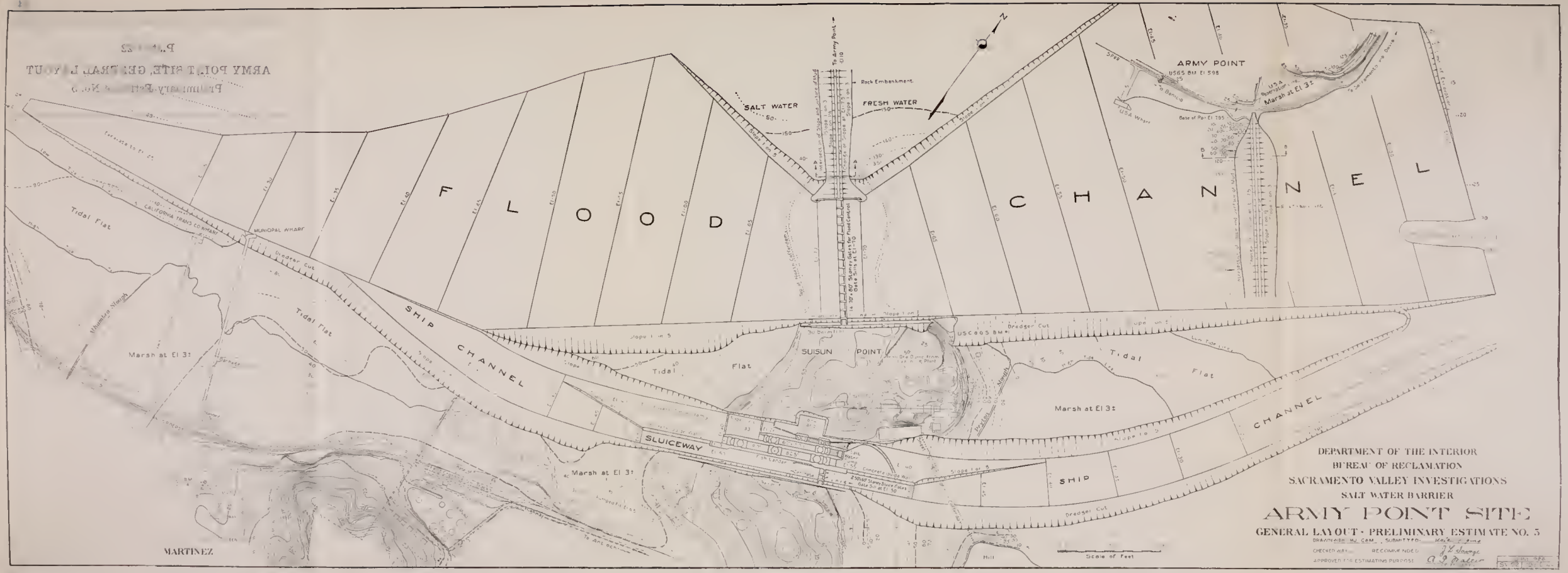
SV-91 | Vicksburg, Miss. June 6, 1928 | 193-D-43

APPROVED FOR ESTIMATING PURPOSES
A. F. Walter
CHIEF ENGINEER

Plate 4-22

ARMY POINT SITE, GENERAL LAYOUT

Preliminary Estimate No. 5


ARMY POINT
USGS BM El 598
USA Wharf
Marsh at El 3±
Base of Pier El 19.5
FLOOD CHANNEL
SALT WATER
FRESH WATER
To Army Point
Rock Embankment
Slope 1 on 3
Slope 1 on 5
Slope 1 on 10
Slope 1 on 2
Slope 1 on 1
Slope 1 on 4
Slope 1 on 6
Slope 1 on 7
Slope 1 on 8
Slope 1 on 9
Slope 1 on 12
Slope 1 on 15
Slope 1 on 20
Slope 1 on 25
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Slope 1 on 800
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Slope 1 on 1000
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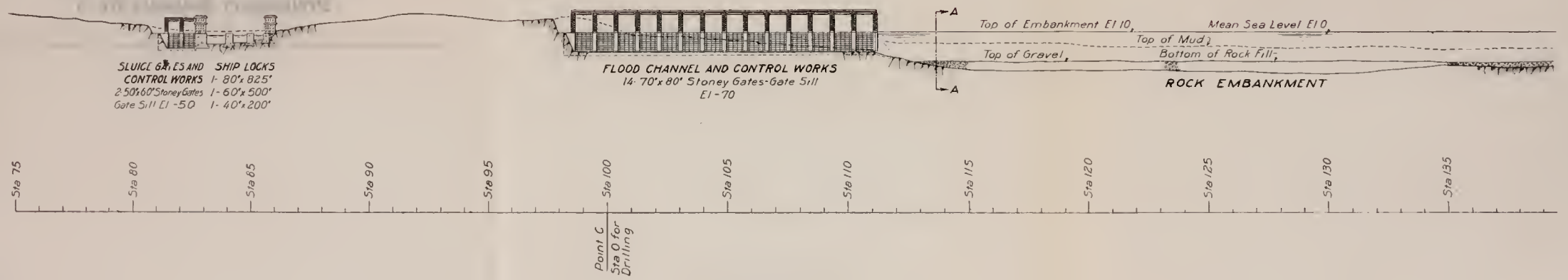
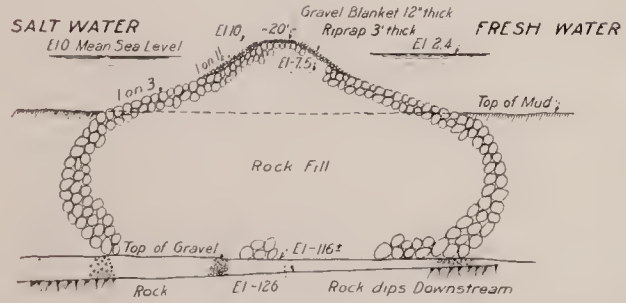
Plate 4-23

ELEVATION AND SECTIONS

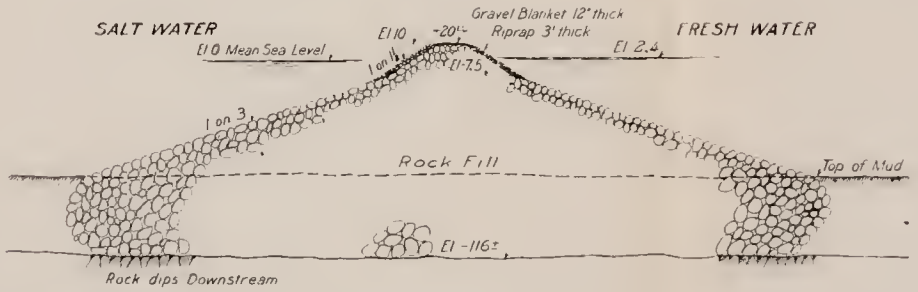
Preliminary Estimate No. 5



UPSTREAM ELEVATION
(Developed)



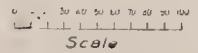
SECTION A-A



SECTION B-B
(For Location see General Layout for Estimate No 5)

EMBANKMENT SECTIONS

Notes:-
Rock Fill to be placed by Bottom Dump Barges up to Maximum Elevation permitted by draft Remainder to be placed by Derrick Barges and Skips



PRELIMINARY DESIGN

APPROVED FOR ESTIMATING PURPOSES
A. P. Walter
CHIEF ENGINEER

DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS
SALT WATER BARRIER
ELEVATION AND SECTIONS
PRELIMINARY ESTIMATE NO 5

DRAWN C.M.J. C.A.M. SUBMITTED
CHECKED N.J.H. RECOMMENDED

SV-93 | Illustr. J. Nast Nov 10 1928 | 193-D-65

Plate 4-24

CONTROL WORKS, 50′ x 60′ GATE

Preliminary Estimates No. 5 and No. 8

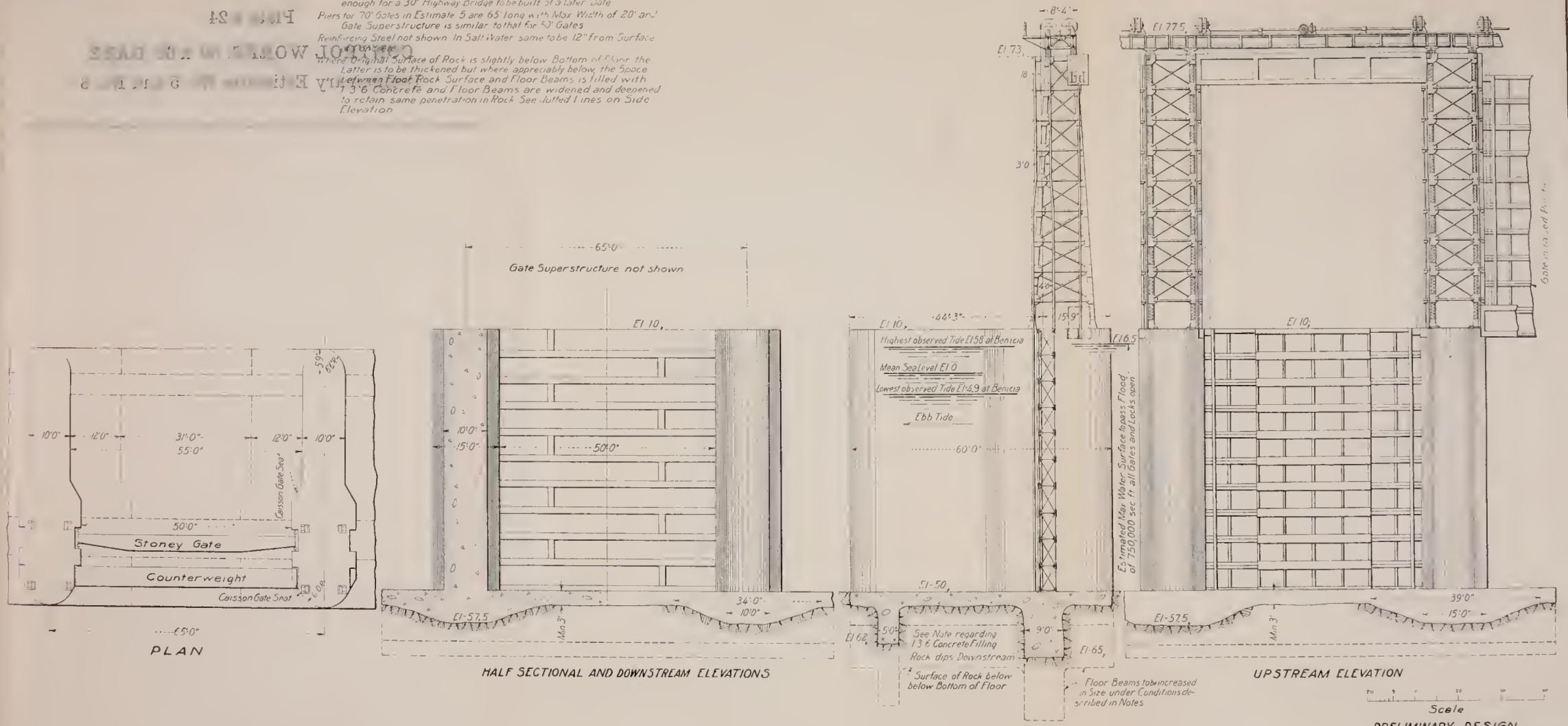
Notes:-

No bridge Crossing is contemplated for the Structure but the Piers long enough for a 30' Highway Bridge to be built at a later Date

Piers for 70' Gates in Estimate 5 are 65' long with Max Width of 20' and Gate Superstructure is similar to that for 50' Gates

Reinforcing Steel not shown In Salt Water same to be 12" from Surface of Concrete

Where Original Surface of Rock is slightly below Bottom of Floor the Latter is to be thickened but where appreciably below, the Space between Floor Rock Surface and Floor Beams is filled with 1:3:6 Concrete and Floor Beams are widened and deepened to retain same penetration in Rock See Jutted Lines on Side Elevation


Gate Superstructure not shown
Stoney Gate
Counterweight
Caisson Gate Seat
Highest observed Tide El 5.8 at Benicia
Mean Sea Level El 0
Lowest observed Tide El -4.9 at Benicia
Ebb Tide
Estimated Max. Water Surface bypass Flood of 750,000 sec ft all Gates and Locks open.
See Note regarding 1:3:6 Concrete Filling Rock dips Downstream
Surface of Rock below below Bottom of Floor
Floor Beams to be increased in Size under Conditions described in Notes
PLAN
HALF SECTIONAL AND DOWNSTREAM ELEVATIONS
SIDE ELEVATION
UPSTREAM ELEVATION
Scale

PRELIMINARY DESIGN

APPROVED FOR ESTIMATING PURPOSES
A. P. Walter
CHIEF ENGINEER

DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS
SALT WATER BARRIER
CONTROL WORKS-50'x60' GATE
PRELIMINARY ESTIMATES NOS 5 AND 9

DRAWN [illegible] SUBMITTED W. W. Young
CHECKED V.B.H. RECOMMENDED [illegible]

SV-94 | Berkeley, Calif. May 28 1936

Plate 4-25

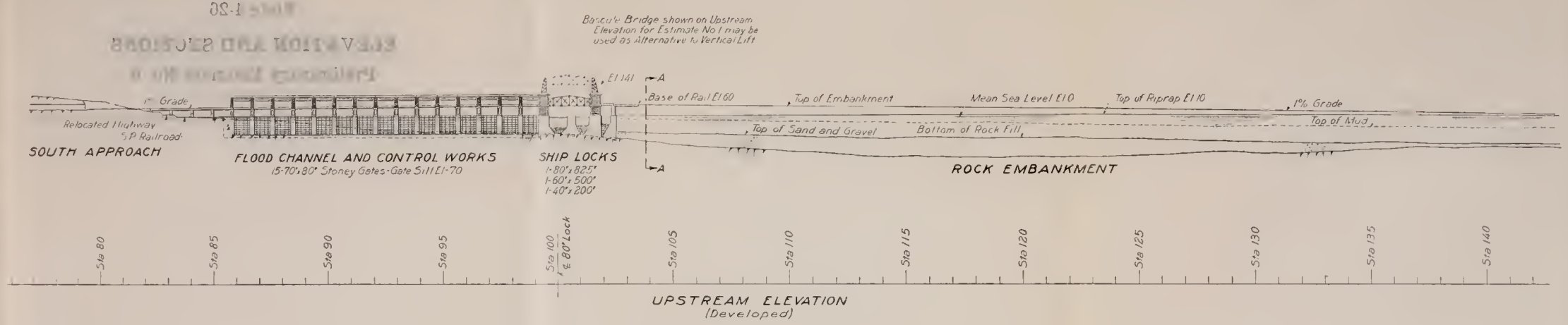
ARMY POINT—MARTINEZ SITE
GENERAL LAYOUT
Preliminary Estimate No. 6

FLOOD
CHANNEL
SALT WATER
FRESH WATER
Rock Embankment
Dredger Cut
Fish Ladder
Salt Water Sump El 33
Caisson Type Gate Wall
End of 1% Grade
Base of Rail El 60 across Locks
Slope 1 on 5
Slope 1 on 3
Slope 1 on 1
Dam at El 40
Concrete
Lining
Top of Main Cofferdam
Tidal Flat
Marsh at El 3±
Pumped Fill El 6.5
To Antioch
To Army Point
Excavate to El -35
El -35
Excavation
MARTINEZ
ESCOBAR
MAIN
DUNN
WARD
ALLEN
GREEN
SHELL
Double-track R R Tunnel approximately 2250' long, RR connects with existing Road, West of Alhambra Slough
SUISUN POINT
Tidal Flat
Marsh at El 3±
Hill
Scale of Feet
ARMY POINT
Marsh at El 3±
Rock Embankment
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS
SALT WATER BARRIER
ARMY POINT SITE
GENERAL LAYOUT - PRELIMINARY ESTIMATE NO. 6
DRAWN ABRAHAMS CAM SUBMITTED Mark A Eltzing
PREPARED WRY RECOMMENDED J P Savage
RECOMMENDED FOR ESTIMATING PURPOSES BY C J Walter
JUNE 1926
SV-95 193-D-49

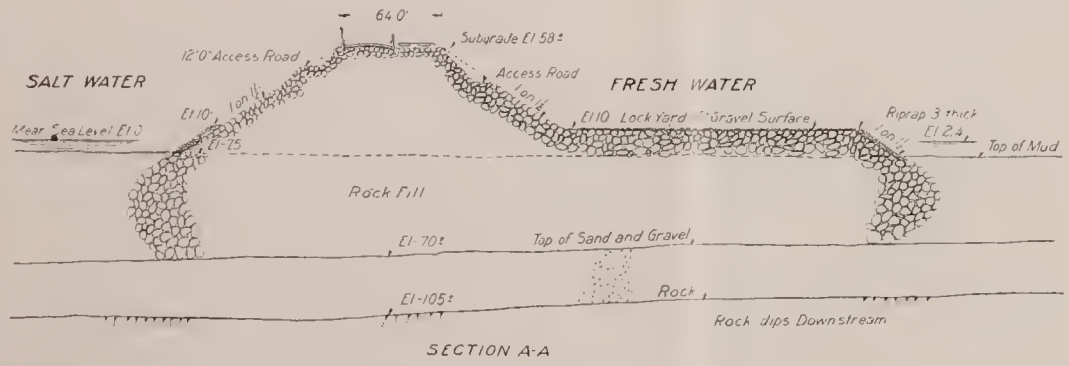
Plate 4-26

ELEVATION AND SECTIONS

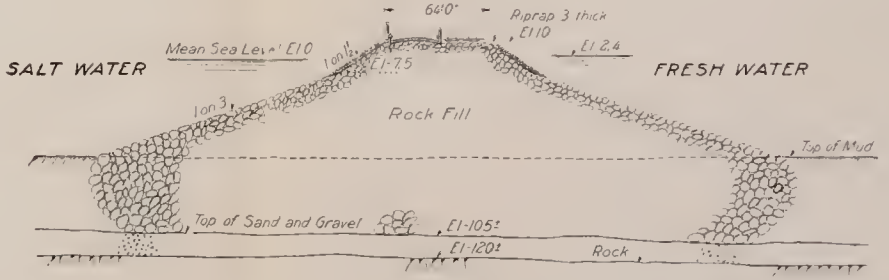
Preliminary Estimate No. 6



UPSTREAM ELEVATION
(Developed)



SECTION A-A



SECTION B-B
For Location see General Layout for Estimate No 6

EMBANKMENT SECTIONS

Notes:
Rock Fill to be placed by Bottom Dump Barges up to Maximum Elevation permitted by draft
Remainder to be placed by Derrick Barges and Skips

Scale

PRELIMINARY DESIGN

APPROVED FOR ESTIMATING PURPOSES
A. P. Walter
CHIEF ENGINEER

DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS
SALT WATER BARRIER
ELEVATION AND SECTIONS
PRELIMINARY ESTIMATE NO 6

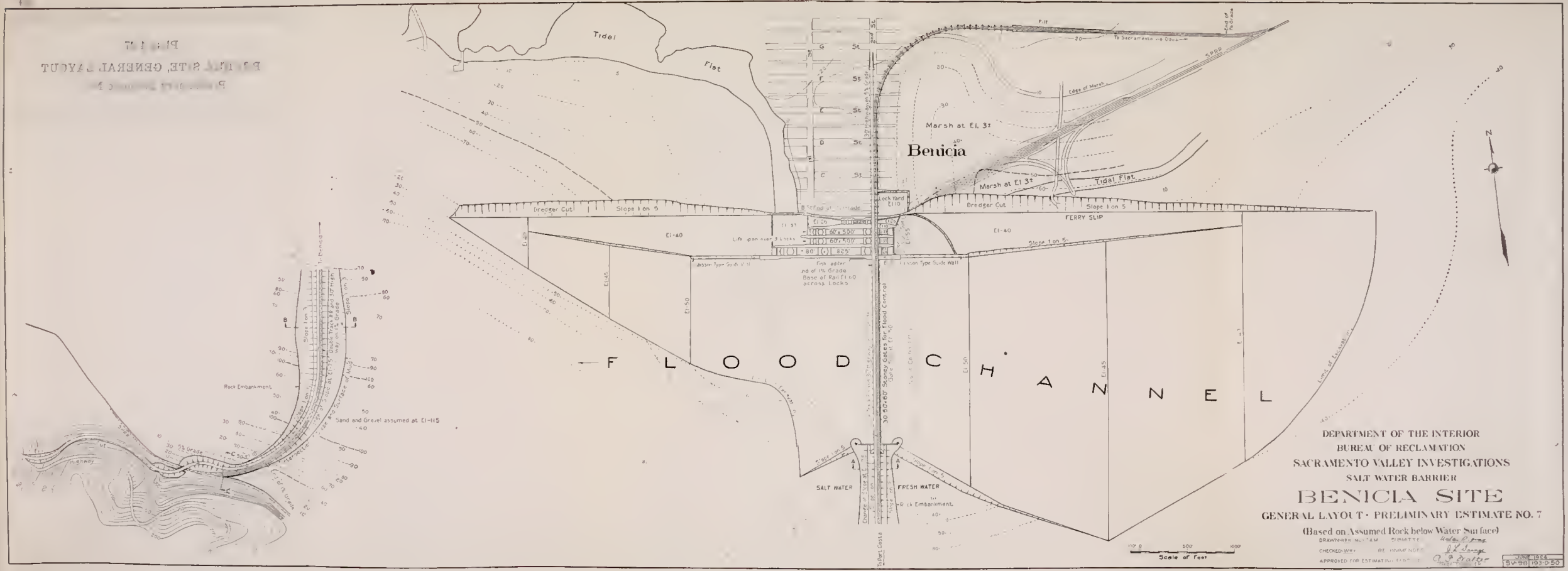
DRAWN CMJ - AM SUBMITTED W. W. Kelly
CHECKED NBH RECOMMENDED C. D. Savage

SV-96 | Ellensburg Wash. June 16, 1926 | 193-D-48

Plate 4-27

BENICIA SITE, GENERAL LAYOUT

Preliminary Estimate No. 7



DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS
SALT WATER BARRIER

BENICIA SITE

GENERAL LAYOUT - PRELIMINARY ESTIMATE NO. 7

(Based on Assumed Rock below Water Surface)

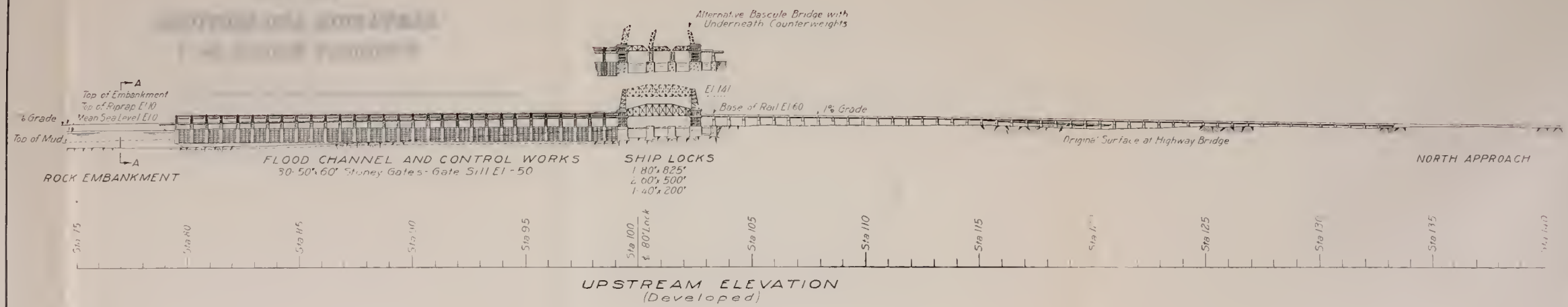
DRAWN-NBR M-A-M SUBMITTED
CHECKED-WKY RECOMMENDED
APPROVED FOR ESTIMATING PURPOSES

JUNE 1964
SV-98 193-D-50

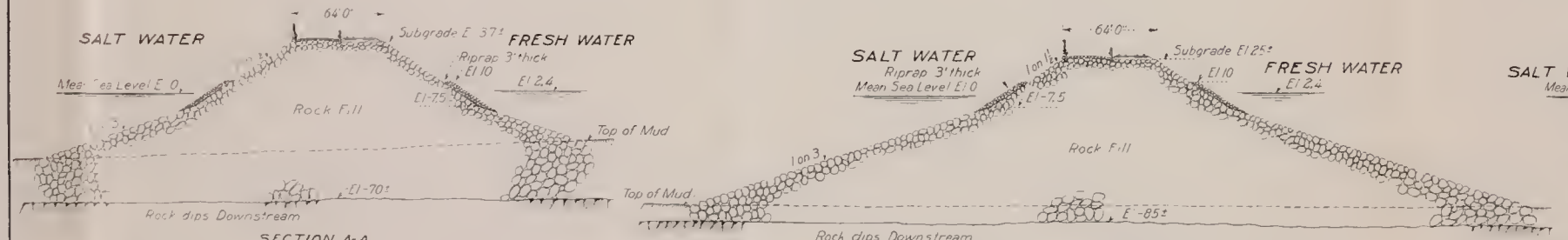
Plate 4-28

ELEVATION AND SECTIONS

Preliminary Estimate No. 7



UPSTREAM ELEVATION
(Developed)



SECTION A-A

SECTION B-B
For location see General Layout for Estimate No. 7

SECTION C-C
For location see General Layout for Estimate [illegible]

EMBANKMENT SECTIONS
Scale

Notes -
This Site not drilled
Rock Fill to be placed by Bottom Dump Barges up to Maximum Elevation permitted by Draft. Remainder to be placed by Derrick Barges and Skips

PRELIMINARY DESIGN

APPROVED FOR ESTIMATING PURPOSES
A. F. Walter
CHIEF ENGINEER

DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS
SALT WATER BARRIER
ELEVATION AND SECTIONS
PRELIMINARY ESTIMATE NO. 7

DRAWN L.M.J. C.A.M. SUBMITTED C. E. Storey
CHECKED C.B.H. RECOMMENDED C. E. Storey

SV-99 | Ellensburg Wash. June 23 1951 | 193-D-51

Plate 4-29

SHIP LOCKS, 4-LOCK PLAN

Notes -

Four Lock Plan adopted in all cases at Benicia and Dillon Point Sites. This Drawing shows Layout for Estimate No 11 but its features are generally applicable to Estimates Nos 7 to 13.

Rock Embankment is provided between Locks and Control Works in some cases.

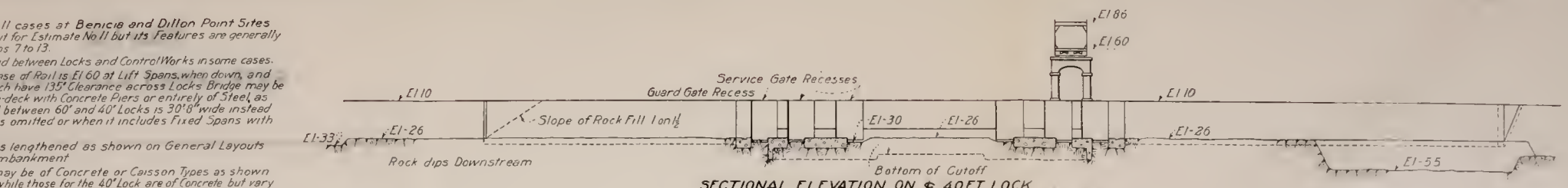
When Bridge is provided, the Base of Rail is El 60 at Lift Spans, when down, and El 147 at Fixed Spans which have 135' Clearance across Locks. Bridge may be either Single deck or Double-deck with Concrete Piers or entirely of Steel, as shown elsewhere. The Wall between 60' and 40' Locks is 30'8" wide instead of 51'6" when the Bridge is omitted or when it includes Fixed Spans with 135' Clearance.

The Outside Wall of 40' Lock is lengthened as shown on General Layouts when adjacent to Rock Embankment.

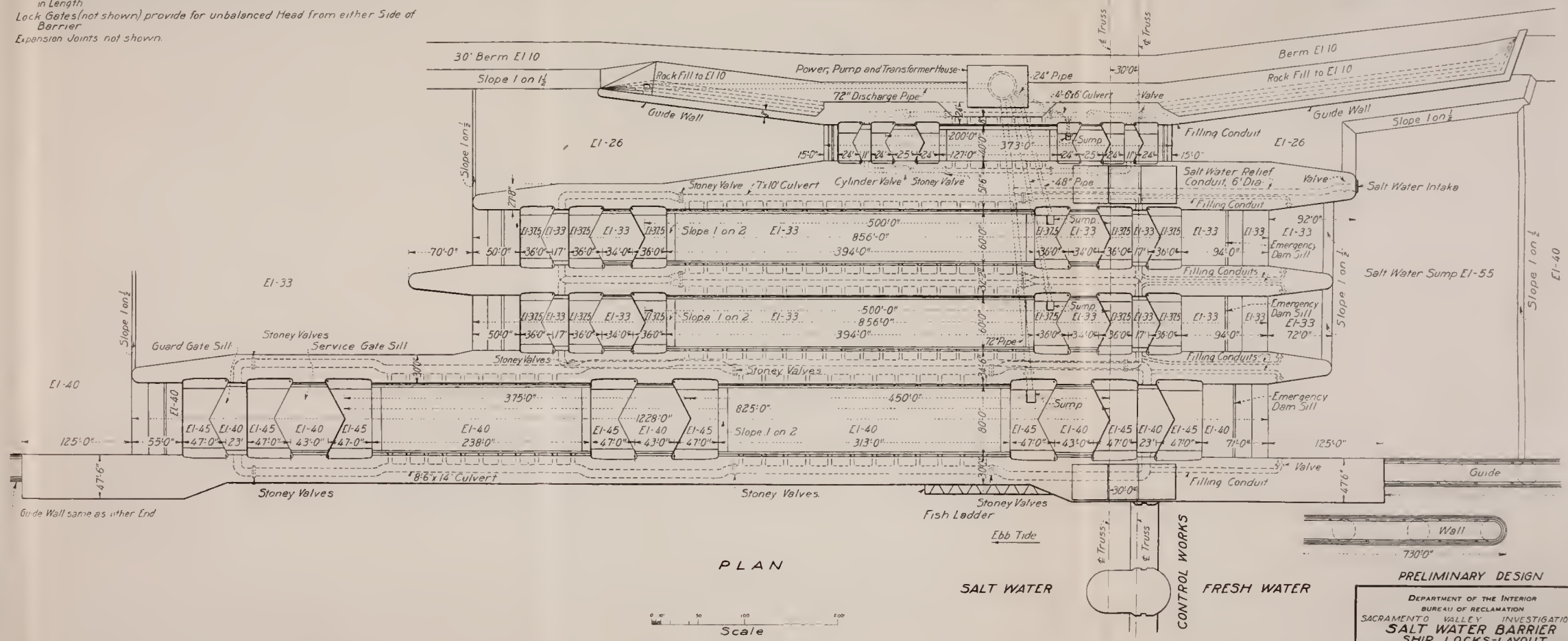
Guide Walls for the 80' Lock may be of Concrete or Caisson Types as shown on Drawing of Guide Walls, while those for the 40' Lock are of Concrete but vary in Length.

Lock Gates (not shown) provide for unbalanced Head from either Side of Barrier.

Expansion Joints not shown.



SECTIONAL ELEVATION ON ℄ 40 FT. LOCK



PLAN

Scale

CONTROL WORKS

SALT WATER — FRESH WATER

PRELIMINARY DESIGN

DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS
SALT WATER BARRIER
SHIP LOCKS-LAYOUT
PRELIMINARY ESTIMATES NOS. 7 TO 13

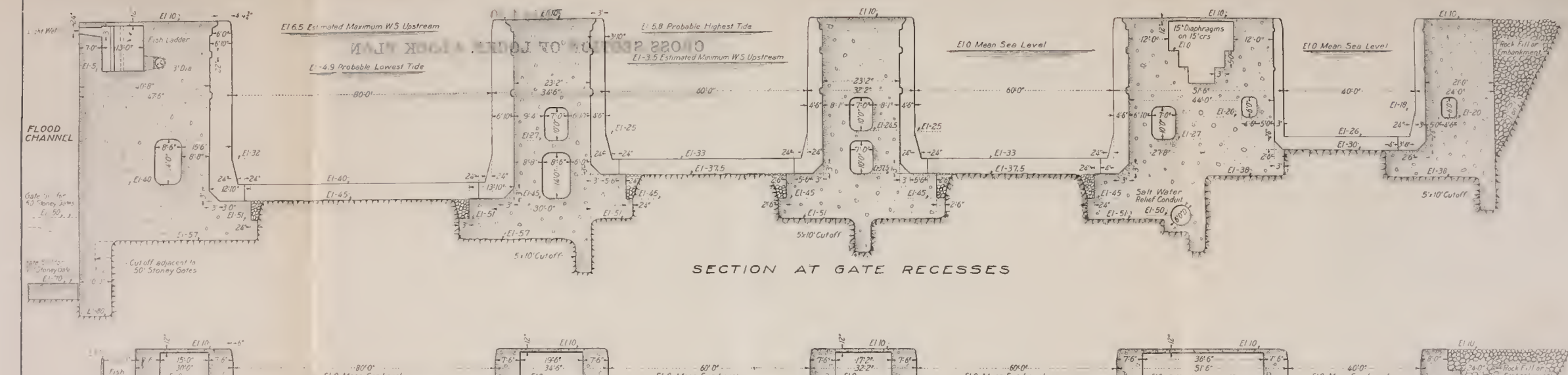
DRAWN CMJ-CAM SUBMITTED
CHECKED N B M RECOMMENDED J. B. Savage

SV-100 | Ellensburg Wash. July 13, 1926 | 193-D-52

APPROVED FOR ESTIMATING PURPOSES-
A. F. Walter
CHIEF ENGINEER

Plate 4-30

CROSS SECTION OF LOCKS, 4-LOCK PLAN


El 6.5 Estimated Maximum W.S. Upstream
El -4.9 Probable Lowest Tide
El 5.8 Probable Highest Tide
El -3.5 Estimated Minimum W.S. Upstream
El 0 Mean Sea Level
FLOOD CHANNEL
Fish Ladder
Gate Sill for 40' Stoney Gates El -50
Cut off adjacent to 50' Stoney Gates
5'x10' Cutoff
15' Diaphragms on 15' crs El 0
Salt Water Relief Conduit
Rock Fill or Embankment
SECTION AT GATE RECESSES
Fish Ladder
El Variable
12' Diaphragms on 15' crs
Width of Wall diminishes to 30'-0" beyond End of 60' Lock
15' Diaphragms on 15' crs
12' Diaphragms on 15' crs
This Wall is 30'-8" wide when the Bridge is omitted or when it includes fixed Spans with 135' clearance
24' Diaphragms on 15' crs
Bottom of Flood Channel for 50' Stoney Gates El -50
Bottom of Flood Channel for 70' Stoney Gates El -70
Cutoff adjacent to 50' Stoney Gates
SECTION BETWEEN GATE RECESSES

Notes -

Four Lock Plan adopted for **Benicia and Dillon Pt Sites** This Drawing shows Sections for Estimate No 11 but its Features are generally applicable to Estimates Nos 7 to 13

Rock Embankment is provided between Locks and Control Works in some Cases

The Wall between the 60' Lock and the Approach to the 40' Lock is the same as shown on Section of Three Lock Plan beyond 40' Lock

When Bridge is provided, a Lift Span 290'-8" long crosses the 80' Lock and both 60' Locks, except in one Case having Fixed Spans with 135' clearance. The arrangement at Ends of Lift Span is similar to that for the Three Lock Plan except for modifications to accommodate the Double-deck Bridge The clearance is the same

Reinforcing Steel not shown. In Salt Water same to be 12" from Face of Concrete

Lock Gates not shown

Scale

PRELIMINARY DESIGN

APPROVED FOR ESTIMATING PURPOSES

A. P. Walter
CHIEF ENGINEER

DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS
SALT WATER BARRIER
SHIP LOCKS - CROSS SECTIONS
PRELIMINARY ESTIMATES NOS 7 TO 13

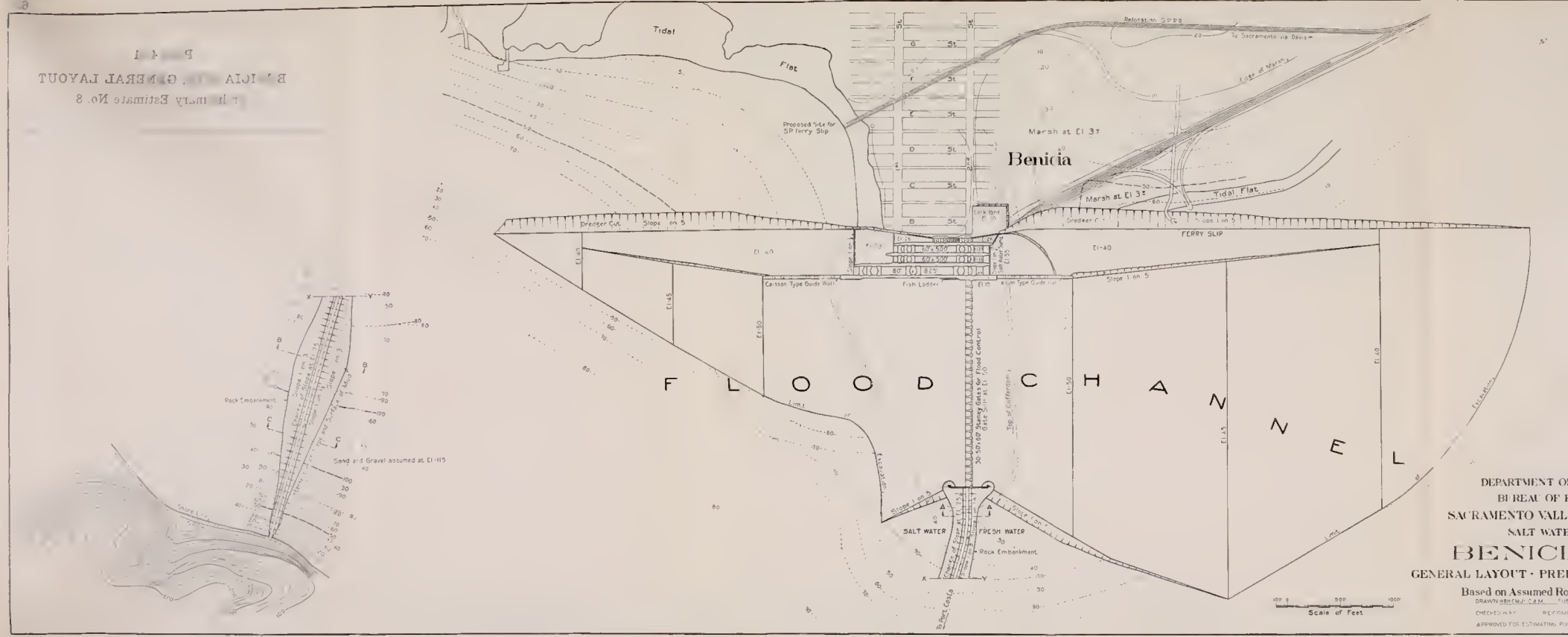
DRAWN EM&CAM SUBMITTED W.H. Jeffreys
CHECKED N.B.M. RECOMMENDED C.K. Savage

SV-101 | Ellensburg Absh. July 14 1926 | 193-D-53

Plate 4-31

BENICIA SITE, GENERAL LAYOUT

Preliminary Estimate No. 8



DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS
SALT WATER BARRIER

BENICIA SITE

GENERAL LAYOUT · PRELIMINARY ESTIMATE NO. 8

Based on Assumed Rock below Water Surface

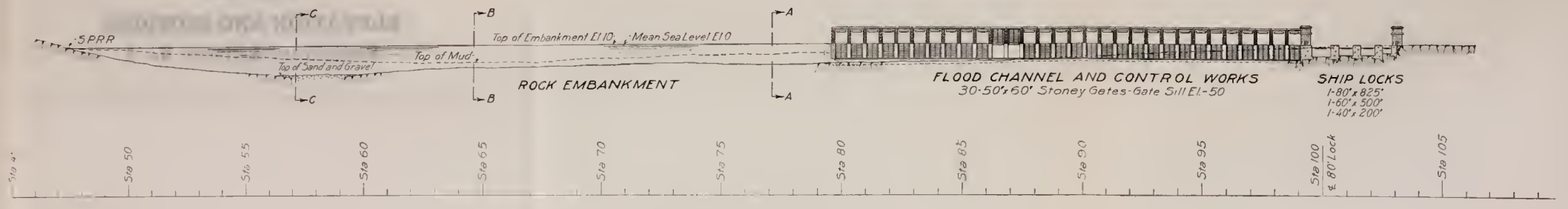
DRAWN HBC/MEF CAM SUBMITTED Chief, Div. of Design
CHECKED ALF RECOMMENDED A.K. Savage
APPROVED FOR ESTIMATING PURPOSES C.J. Potter

JUNE 1958
SV-102 | 193-D-54

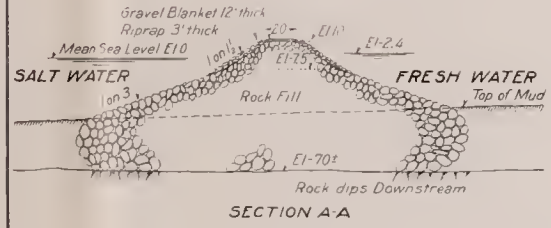
Plate 4-32

ELEVATION AND SECTIONS

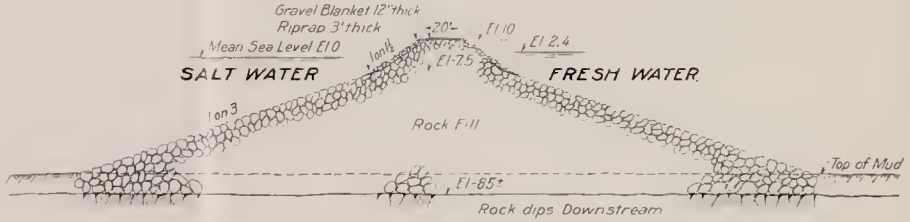
Preliminary Estimate No. 8



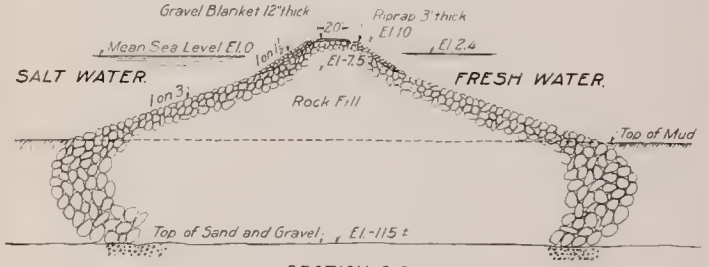
UPSTREAM ELEVATION
(Developed)



SECTION A-A



SECTION B-B



SECTION C-C

EMBANKMENT SECTIONS

Scale

Notes
This Site not drilled
Rock Fill to be placed by Bottom Dump Barges up to Maximum Elevation permitted by draft
Remainder to be placed by Derrick Barges and Skips.

PRELIMINARY DESIGN

DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS
SALT WATER BARRIER
ELEVATION AND SECTIONS
PRELIMINARY ESTIMATE NO 8

DRAWN CMJ-CAM SUBMITTED
CHECKED N.B.M. RECOMMENDED

SV-103 | Ellensburg Wash June 29 1928 | 193-D-55

APPROVED FOR ESTIMATING PURPOSES
A. F. Walter
CHIEF ENGINEER

Plate 4-33

DILLON POINT SITE, GENERAL LAYOUT

Preliminary Estimate No. 9

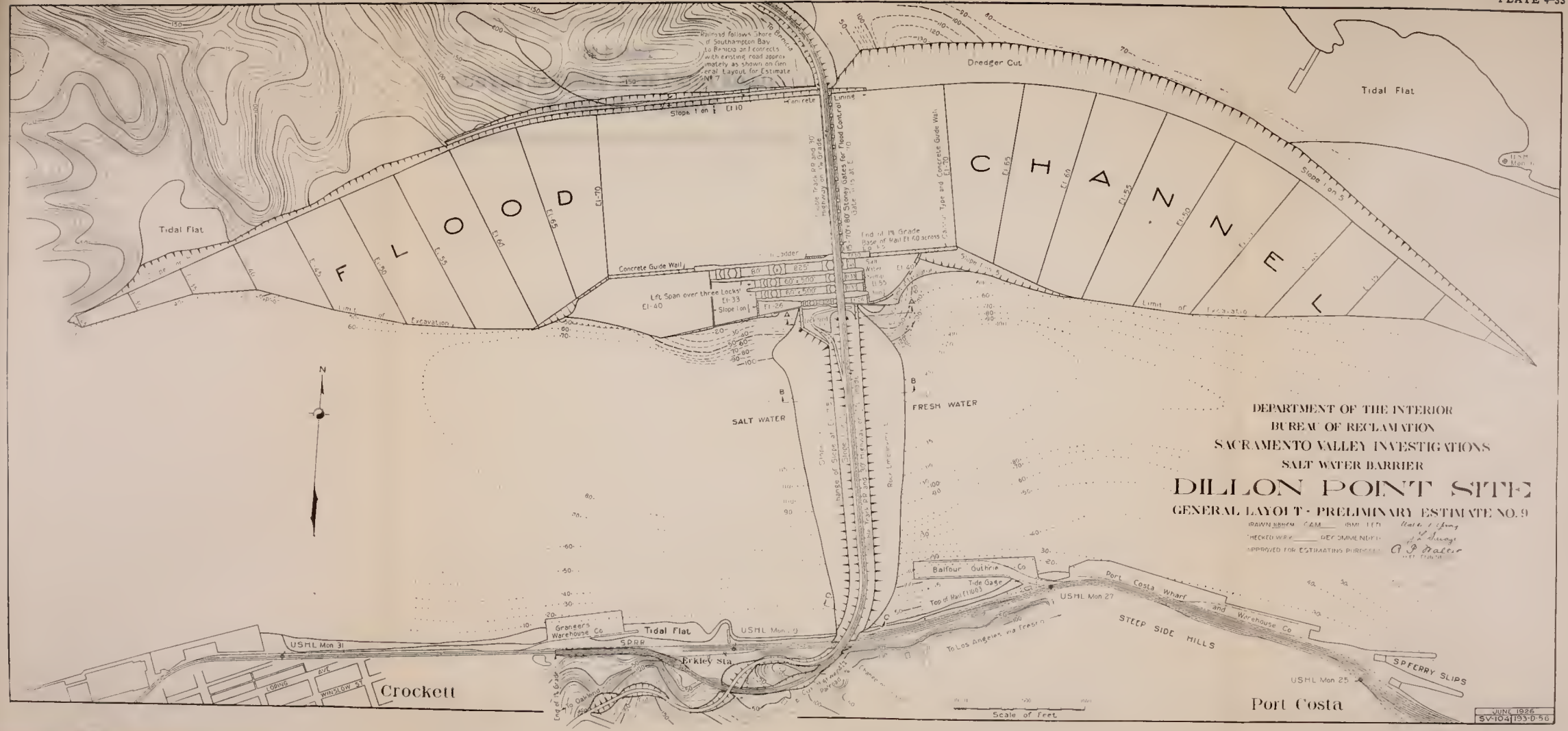
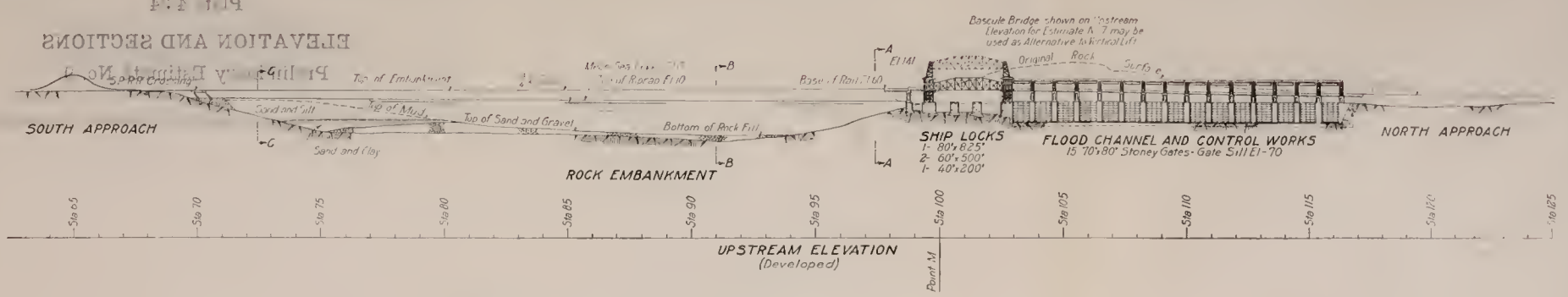
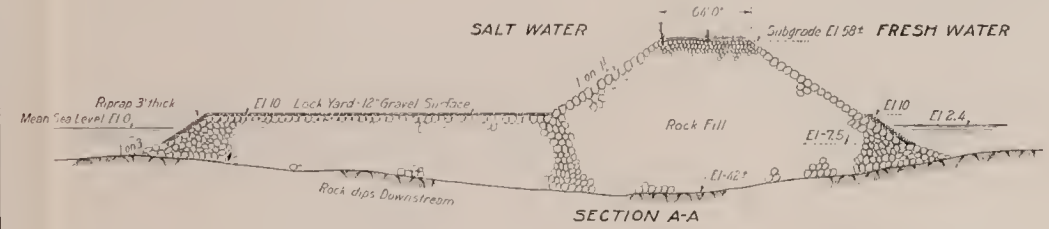

Railroad follows Shore of Southampton Bay to Benicia and connects with existing road approximately as shown on General Layout for Estimate No. 7
To Benicia
Dredger Cut
Tidal Flat
Slope 1 on 1
El 10
Reinforced Concrete Lining
Inside Track RR and 30' Highway on Top of Grade
Type and Concrete Guide Wall
El 70
End of 1% Grade
Base of Wall El 40 across Gate
70' - 80' Stoney Gates for Flood Control
Slope 1 on 5
FLOOD
CHANNEL
El 65
El 60
El 55
El 50
Tidal Flat
Concrete Guide Wall
Lift Span over three Locks
El 33
El 26
Slope 1 on 1
Limit of Excavation
Limit of Excavation
Salt Water
El 40
El 55
Fresh Water
SALT WATER
FRESH WATER
N
Balfour Guthrie Co
Tide Gate
Top of Wall El 10.3
Port Costa Wharf and Warehouse Co
USHL Mon 27
STEEP SIDE HILLS
To Los Angeles via Fresno
SPFERRY SLIPS
USHL Mon 25
Graneers Warehouse Co
Tidal Flat
USHL Mon 29
SPRR
USHL Mon 31
Erkley Sta
CORING
AVE
WINSLOW ST
Crockett
Port Costa
Scale of Feet
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS
SALT WATER BARRIER
DILLON POINT SITE
GENERAL LAYOUT - PRELIMINARY ESTIMATE NO. 9
DRAWN WHEM C.A.M. TRACED
CHECKED W.H.E. RECOMMENDED
APPROVED FOR ESTIMATING PURPOSES
A. P. Frazier
ACTING REGIONAL DIRECTOR
JUNE 1926
SV-104 193-D-56

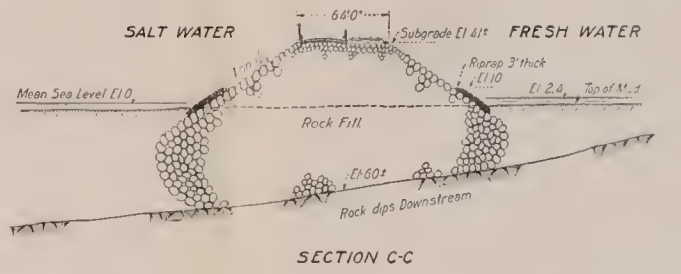
Plate 4-34

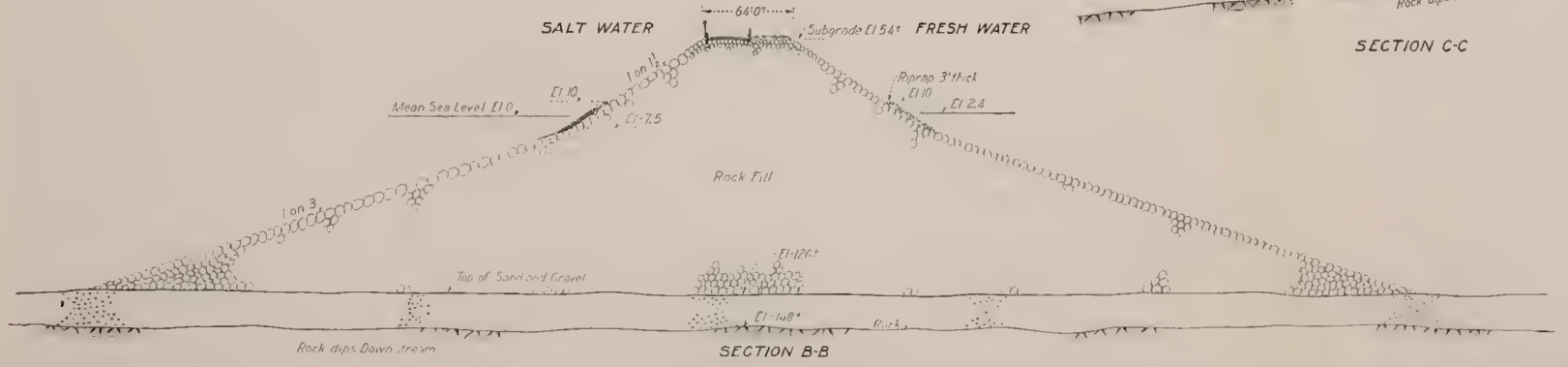
ELEVATION AND SECTIONS

Preliminary Estimate No. 9









Notes:
Rock Fill to be placed by Bottom Dump Barges up to Maximum Elevation permitted by draft. Remainder to be placed by Derrick Barges and Scows.

Scale

PRELIMINARY DESIGN

APPROVED FOR ENGINEERING PURPOSES
A. P. Molter
CHIEF ENGINEER

DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS
SALT WATER BARRIER
ELEVATION AND SECTIONS
PRELIMINARY ESTIMATE NO. 9

DRAWN CHECKED SUBMITTED W.P. Young
CHECKED RECOMMENDED C.E. Savage

SV-105 | 193-D-57

Plate 4-35

DILLON POINT SITE, GENERAL LAYOUT

Preliminary Estimate No. 10

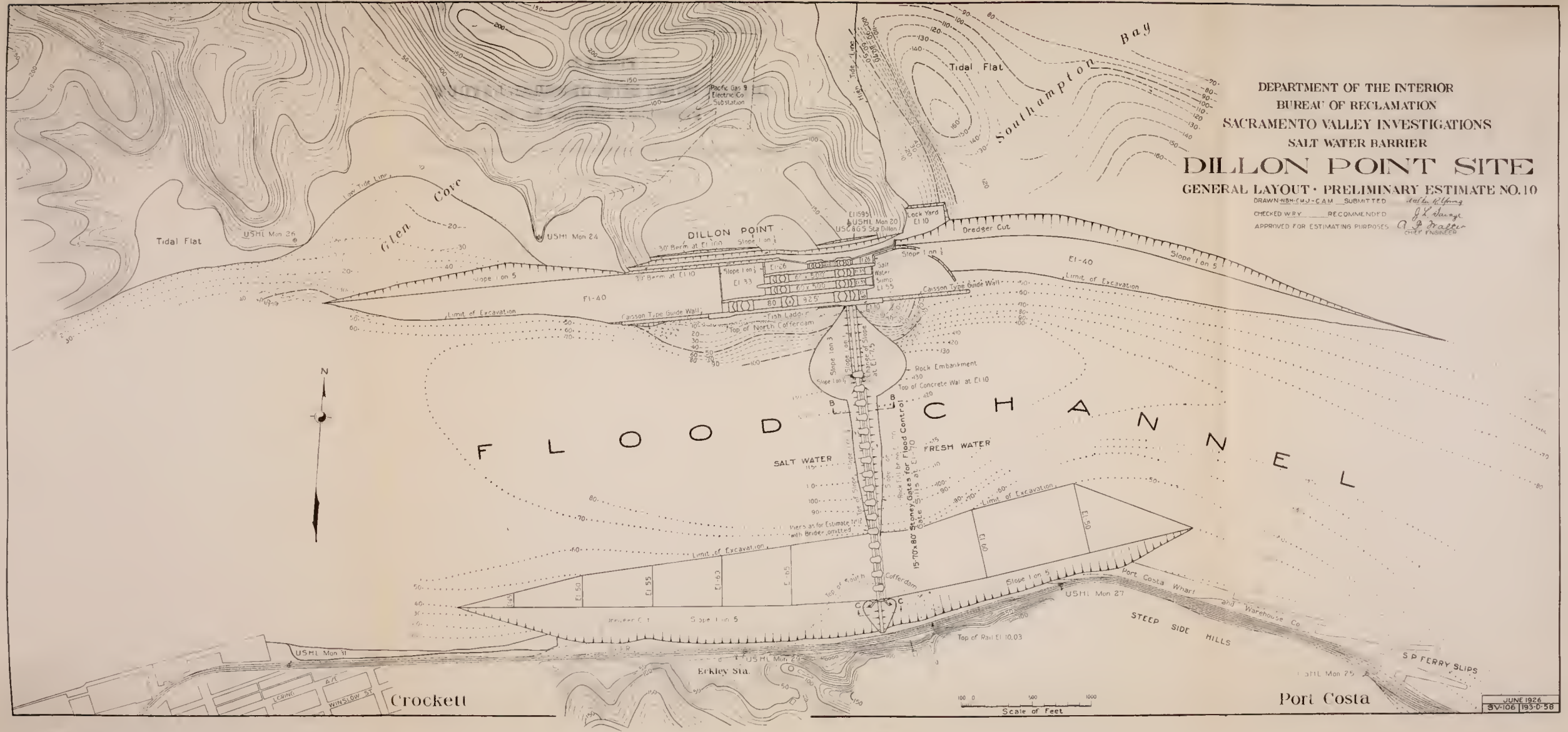
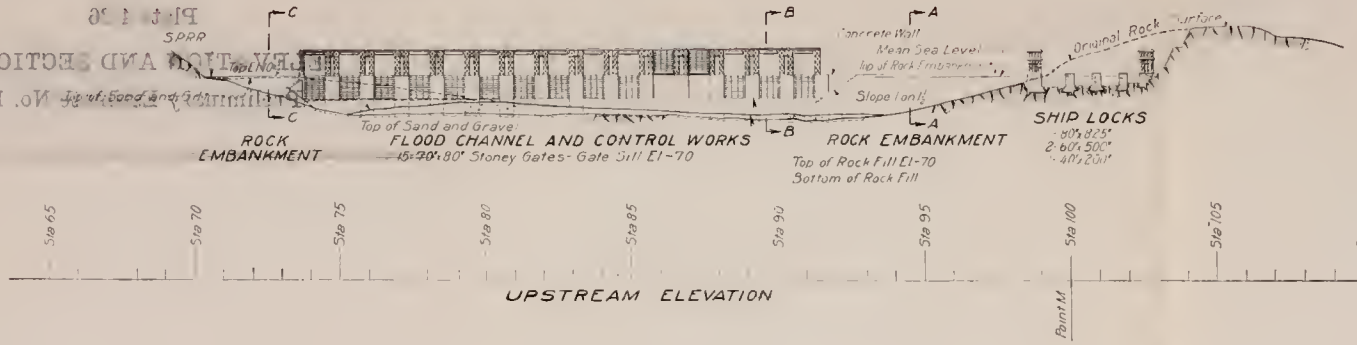
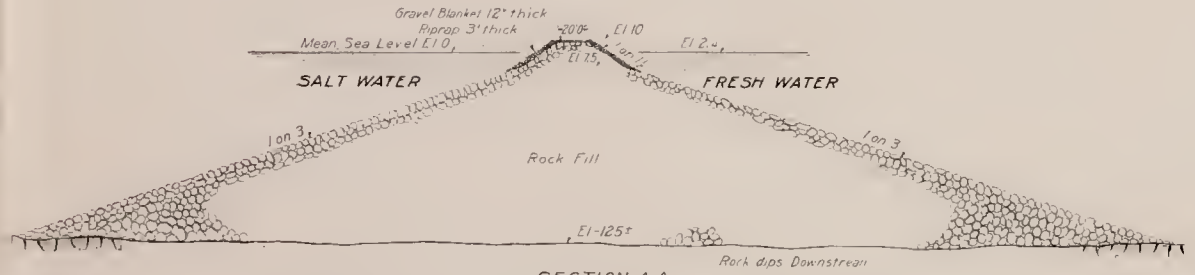

DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS
SALT WATER BARRIER
DILLON POINT SITE
GENERAL LAYOUT · PRELIMINARY ESTIMATE NO. 10
DRAWN NBH-CWJ-CAM SUBMITTED
CHECKED W.R.Y. RECOMMENDED
APPROVED FOR ESTIMATING PURPOSES
CHIEF ENGINEER
JUNE 1926
SV-106 193-D-58
Southampton Bay
Tidal Flat
Glen Cove
Low Tide Line
High Tide Line
DILLON POINT
Pacific Gas & Electric Co Substation
USHL Mon 26
USHL Mon 24
USHL Mon 20
USC&GS Sta Dillon
Lock Yard El 10
Dredger Cut
Slope 1 on 5
30' Berm at El 10
Salt Water Sump El 55
Caisson Type Guide Wall
Limit of Excavation
Fish Ladder
Top of North Cofferdam
Rock Embankment
Top of Concrete Wall at El 10
FLOOD CHANNEL
SALT WATER
FRESH WATER
15-70'x80' Stoney Gates for Flood Control
Piers as for Estimate No 2 with Bridge omitted
Top of South Cofferdam
Port Costa Wharf and Warehouse Co
STEEP SIDE HILLS
Top of Rail El 10.03
S P FERRY SLIPS
USHL Mon 31
USHL Mon 29
USHL Mon 25
Erkley Sta.
LORING
WINSLOW ST
Crockett
Port Costa
Scale of Feet

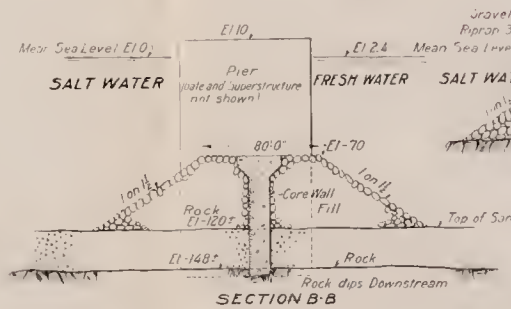
Plate 4-36

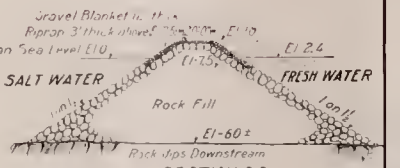
ELEVATION AND SECTIONS

Preliminary Estimate No. 10









Notes-

Rock Fill to be placed by Bottom Dump Barges up to Maximum Elevation permitted by draft. Remainder to be placed by Derrick Barges and Skips

Section A-A shows Embankment placed in running Water

Section B-B shows Rock Fill deposited around Core Wall under Stoney Gates where action of Current is negligable below El -70

Section C-C shows Embankment placed inside South Cofferdam

Control Works Piers are similar to Piers for Estimate No 12 with Bridge omitted

EMBANKMENT SECTIONS

Scale

PRELIMINARY DESIGN

APPROVED FOR ESTIMATING PURPOSES:
A. P. Walter
CHIEF ENGINEER

DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS
SALT WATER BARRIER
ELEVATION AND SECTIONS
PRELIMINARY ESTIMATE NO 107

DRAWN CMJ-CAM LCH SUBMITTED W.P. Young
CHECKED N.D.H. RECOMMENDED W.H. Savage

SV-107 Ellensburg Wash July 8 1926 193-D-59

Plate 4-37

DILLON POINT SITE, GENERAL LAYOUT

Preliminary Estimates No. 11 and No. 12

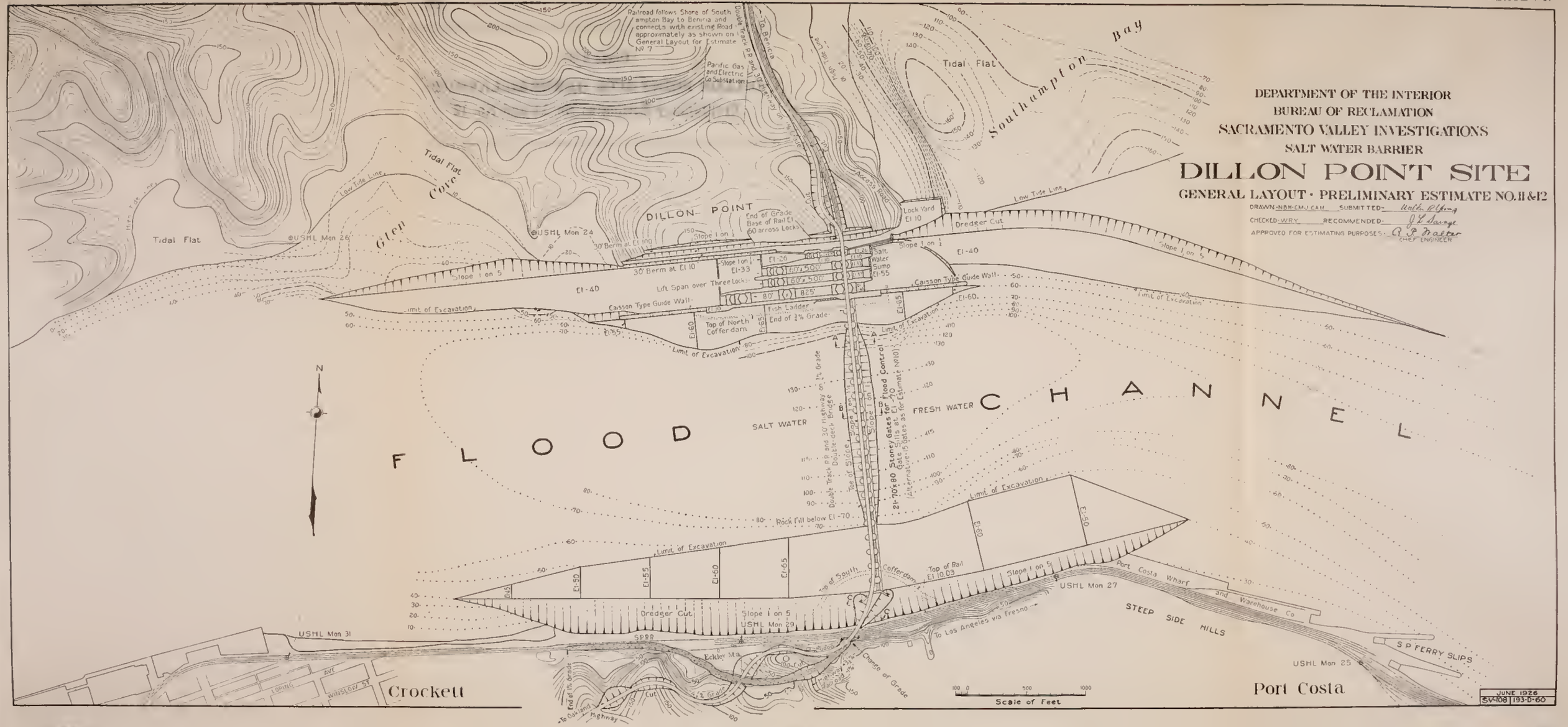
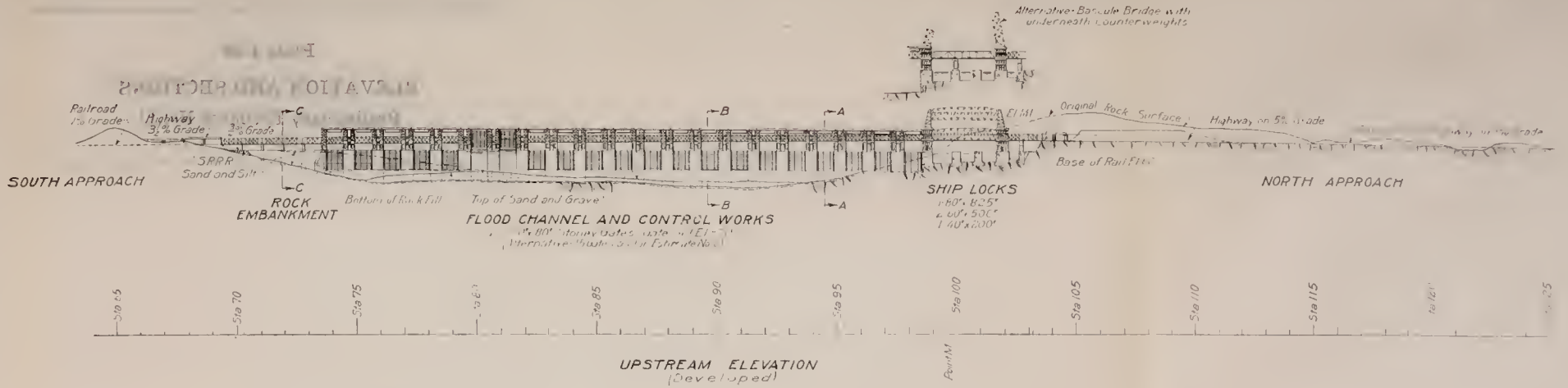
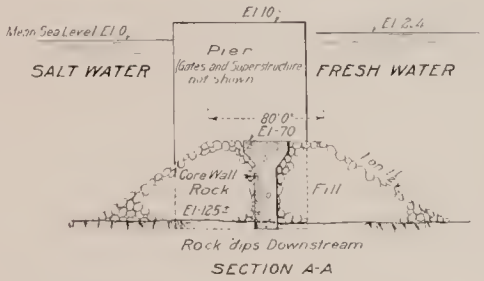

DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS
SALT WATER BARRIER
DILLON POINT SITE
GENERAL LAYOUT · PRELIMINARY ESTIMATE NO. 11 & 12
DRAWN-NBH-EMJ CAM SUBMITTED- Walter P. Young
CHECKED-WRY RECOMMENDED- J. L. Savage
APPROVED FOR ESTIMATING PURPOSES- A. P. Walter CHIEF ENGINEER
JUNE 1926
SV-108 193-D-60
Railroad follows Shore of Southampton Bay to Benicia and connects with existing Road approximately as shown on General Layout for Estimate No. 7
Pacific Gas and Electric Co Substation
To Benicia
Double Track R.R. and 30' Highway
Tidal Flat
Southampton Bay
Glen Cove
Mean Tide
Low Tide Line
USHL Mon 26
USHL Mon 24
DILLON POINT
30' Berm at El 10
30' Berm at El 100
Slope 1 on 5
Slope 1 on 1
End of Grade Base of Rail El 60 across Locks
Access Road
Lock Yard El 10
Dredger Cut
El-40
Salt Water Sump El-55
El-26
60' x 500'
60' x 500'
80' x 825'
Lift Span over Three Locks
Caisson Type Guide Wall
Limit of Excavation
Fish Ladder
End of 3/4% Grade
Top of North Cofferdam
El-60
El-65
El-55
FLOOD CHANNEL
SALT WATER
FRESH WATER
Toe of Slope
Double Track R.R. and 30' Highway on 1% Grade Double deck Bridge
21-70'x80' Stoney Gates for Flood Control El -70
Gate Sills as for Estimate No 10
(Alternative 15 Gates as for Estimate No 10)
Rock Fill below El -70
Top of South Cofferdam
Top of Rail El 10.03
El-50
Port Costa Wharf and Warehouse Co
USHL Mon 27
STEEP SIDE HILLS
S P FERRY SLIPS
USHL Mon 25
USHL Mon 31
SPRR
Eckley Mt.
To Las Angeles via Fresno
Change of Grade
To Oakland Highway
End of 1% Grade
2 1/2% Grade
Cut
Crockett
Port Costa
LORING AVE
WINSLOW ST
Scale of Feet
100 0 500 1000

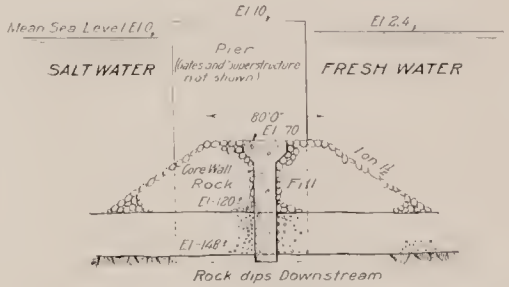
Plate 4-38

ELEVATION AND SECTIONS

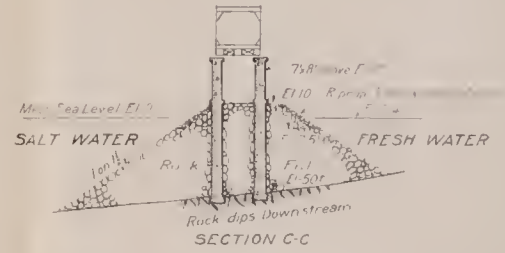
Preliminary Estimate No. 11







EMBANKMENT SECTIONS



Notes:

Rock Fill to be placed by Bottom Dump Barges up to Maximum Elevation permitted by draft. Remainder to be placed by Derrick Barges and Skips.

Sections A-A and B-B show Rock Fill deposited around Core Wall under Stoney Gates where action of Current is negligible below El -70.

Section C-C shows Embankment placed inside South Cofferdam.

Alternative Estimate No. 11 gives cost with only 15 Flood Gates, located as for Estimate No. 10.

Scale

PRELIMINARY DESIGN

DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS
SALT WATER BARRIER
ELEVATION AND SECTIONS
PRELIMINARY ESTIMATE NO. 10

APPROVED FOR ESTIMATING PURPOSES
A. P. Walter
CHIEF ENGINEER

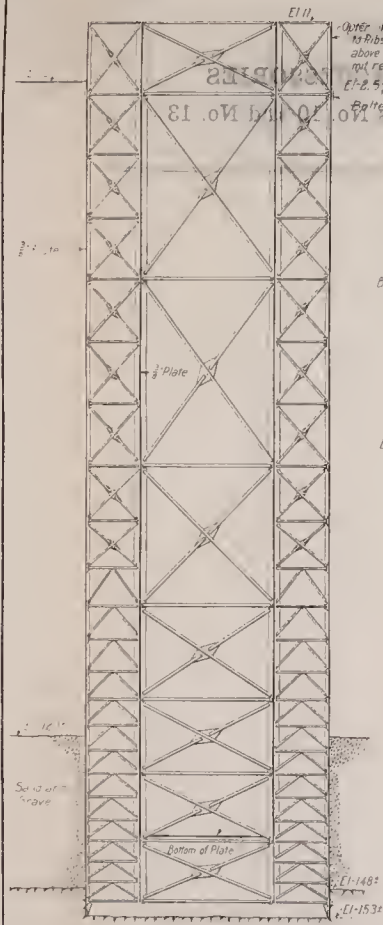
DRAWN [illegible] SUBMITTED [illegible]
CHECKED [illegible] RECOMMENDED [illegible]

SV-109 | 193-D-61

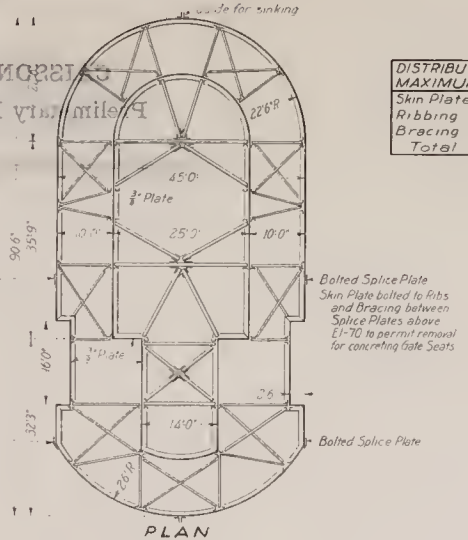
Plate 4-39

CAISSONS AND ACCESSORIES

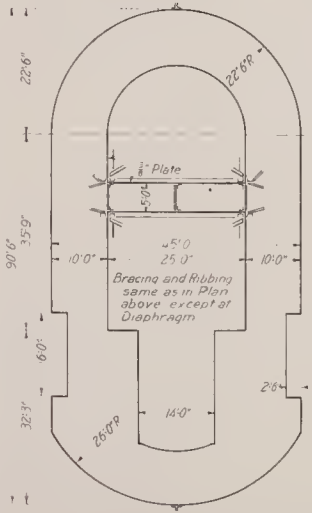
Preliminary Estimates No. 10 and No. 13



MAXIMUM SECTIONAL ELEVATION



PLAN



SECTIONAL PLAN BELOW TOP OF DIAPHRAGM

PIER CAISSON

DISTRIBUTION OF WEIGHT IN MAXIMUM PIER CAISSON	
Skin Plates	510 tons
Ribbing	260 "
Bracing	85 "
Total	855 tons

Notes

Pier Caissons differ slightly in Plan in the various Schemes estimated. Plans on this Sheet show Requirements for Estimate No 11

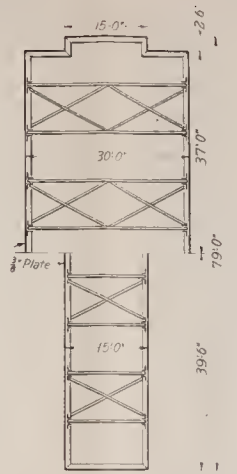
Working Stress in Steel = 24,000 lbs per sq in

Weight of Maximum Pier Caisson in Air = 855 Tons Maximum Weight to be supported by Traveler = 700 Tons

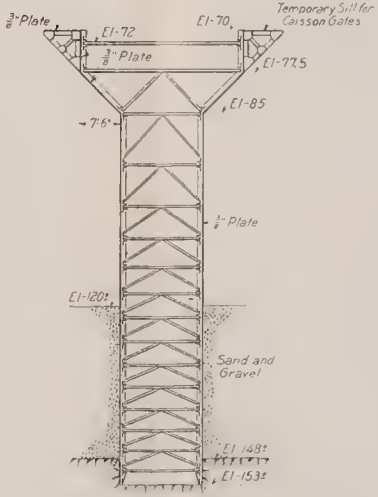
Dredging to be carried on thru Wells provided by omitting Diagonal Bracing in Alternate Panels of Pier Caissons, Core Wall Caissons and Caisson Gate Frame

Oversize allowances for positional Errors, incidental to Caisson sinking, are deemed an unnecessary Refinement at this Stage of Design

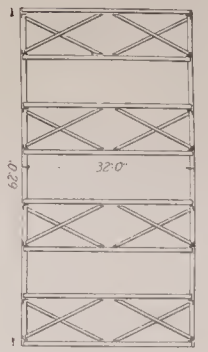
Scale



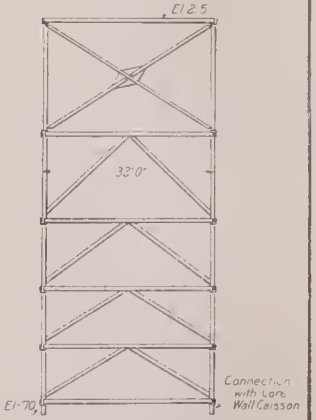
HALF TOP AND HALF SECTIONAL PLANS



MAXIMUM SECTIONAL ELEVATION
CORE WALL CAISSON



PLAN



SECTION
CAISSON GATE FRAME

PRELIMINARY DESIGN

APPROVED FOR ESTIMATING PURPOSES:
R. F. Walter
CHIEF ENGINEER

DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS
SALT WATER BARRIER
CAISSONS AND ACCESSORIES
PRELIMINARY ESTIMATES NOS 10 TO 13

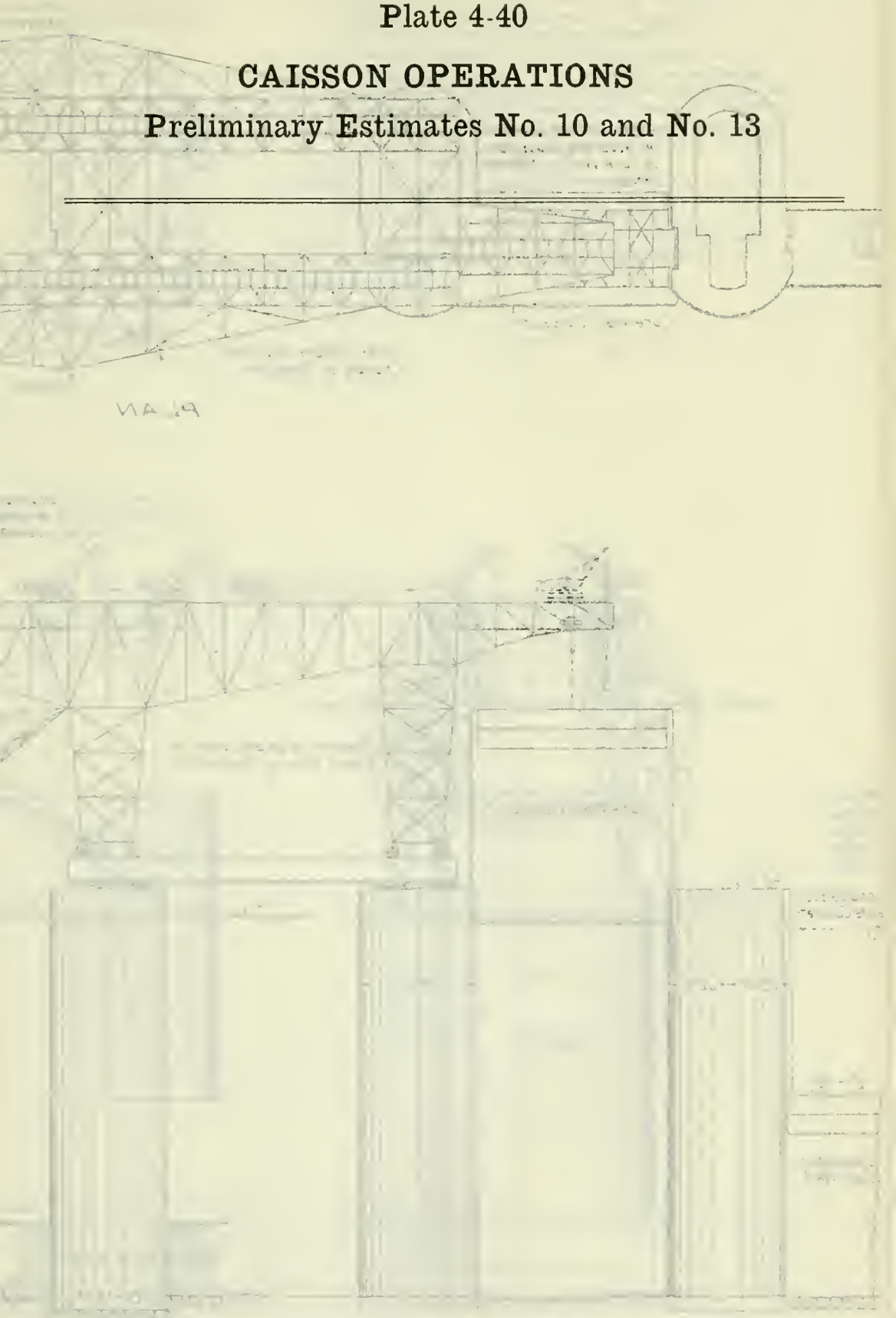
DRAWN CMJ-CAM SUBMITTED W.F. Hyslop
CHECKED NBH RECOMMENDED O.K. Savage

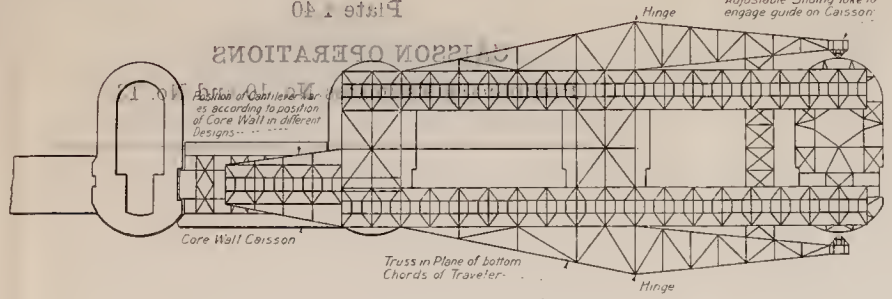
SV-110 | Fillmore Building Washington Aug 27 1926 | 193-D-62

Plate 4-40

CAISSON OPERATIONS

Preliminary Estimates No. 10 and No. 13




Hinge
Adjustable Sliding Yoke to engage guide on Caisson
Position of Cantilever Wa... es according to position of Core Wall in different Designs
Core Wall Caisson
Truss in Plane of bottom Chords of Traveler
Hinge

PLAN

Notes

Piers differ slightly in Plan in the various Schemes estimated, to meet Requirements of Superstructure Piers on this Sheet adopted for Estimate No 11

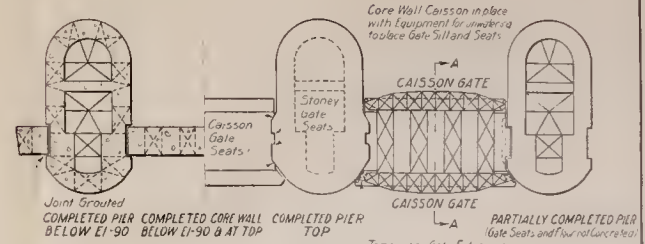
Flood Channel excavated to El -70 before Caissons are sunk

Bottom Sections of Caissons to be towed to Site on Barge and Caissons to be lowered by Traveler as successive Sections are added, until supporting Ground is reached

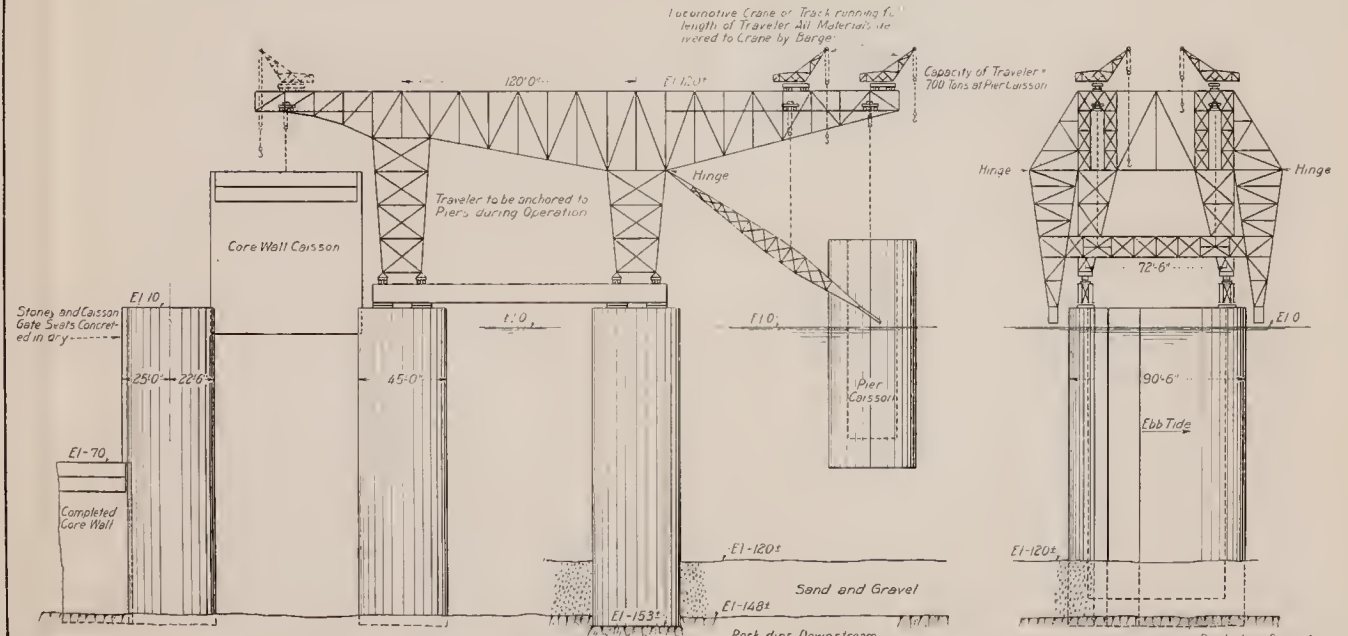
The movable Tremie Plant (not shown) is to replace the Locomotive Cranes in position above the Caissons during Concrete Operations

Caissons assumed not recovered except Portions of Skin Plate of Pier Caissons at unwatered Areas and above El -2.5 and Horizontal Bracing at El 11.

At this Stage of Design it is deemed sufficient to assume Caissons are sunk in Theoretical Positions


Core Wall Caisson in place with Equipment for unwatering to place Gate Sill and Seats
A
CAISSON GATE
Stoney Gate Seats
Caisson Gate Seats
Joint Grouted
CAISSON GATE
A
COMPLETED PIER BELOW El -90
COMPLETED CORE WALL BELOW El -90 & AT TOP
COMPLETED PIER TOP
PARTIALLY COMPLETED PIER (Gate Seats and Roof not Concreted)
Temporary Gate Extension

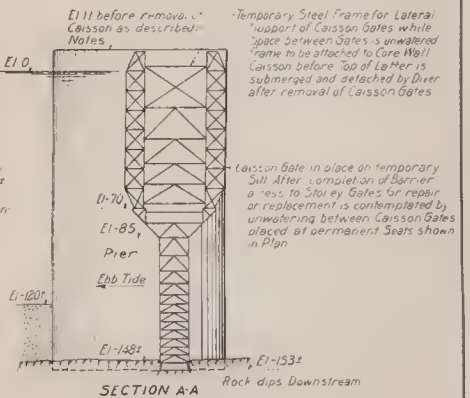
PLAN



UPSTREAM ELEVATION - MAXIMUM PIER TRAVELER

FRONT

Concrete to be placed in Core Wall Caisson by Tremie up to El -72± and remainder below El -70 after unwatering, to permit installing Stoney Gate Sills


El 11 before removal of Caisson as described in Notes
El 10
El -70
El -85
Pier
Ebb Tide
El -120±
El -148±
El -153±
Rock dips Downstream
Temporary Steel Frame for Lateral Support of Caisson Gates while Space between Gates is unwatered Frame to be attached to Core Wall Caisson before Top of Latter is submerged and detached by Diver after removal of Caisson Gates
Caisson Gate in place on temporary Sill After completion of Barrier Access to Stoney Gates for repair or replacement is contemplated by unwatering between Caisson Gates placed at permanent Seats shown in Plan

SECTION A-A

CAISSON ASSEMBLY

Scale

PRELIMINARY DESIGN

DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS
SALT WATER BARRIER
CAISSON OPERATIONS
PRELIMINARY ESTIMATES NOS 10 TO 13

APPROVED FOR ESTIMATING PURPOSES
A. J. Wirth
CHIEF ENGINEER

DRAWN CMJ-CAM SUBMITTED W.K. Fleming
CHECKED N.B.M. RECOMMENDED O.L. Savage

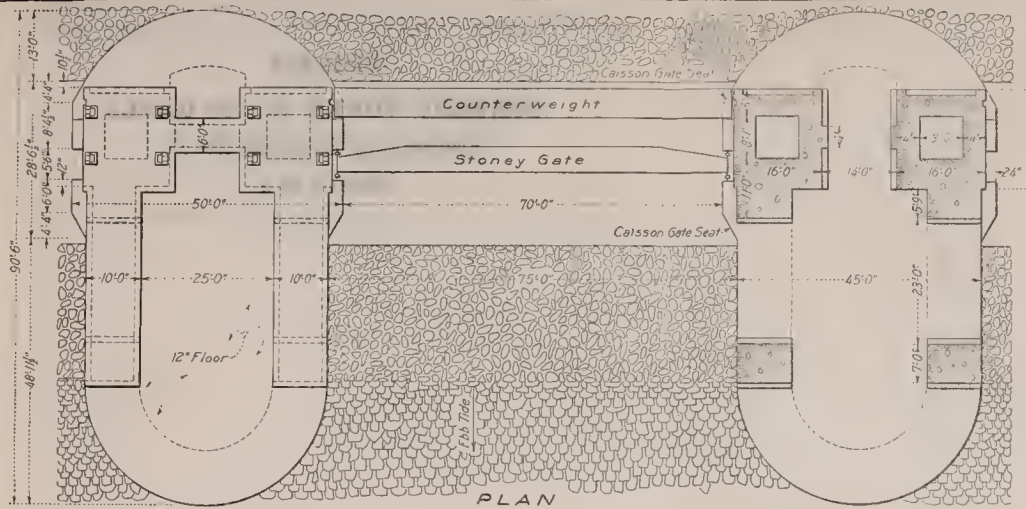
SV-111 | Vicksburg Miss. July 28 1926 | 193-D-63

Plate 4-41

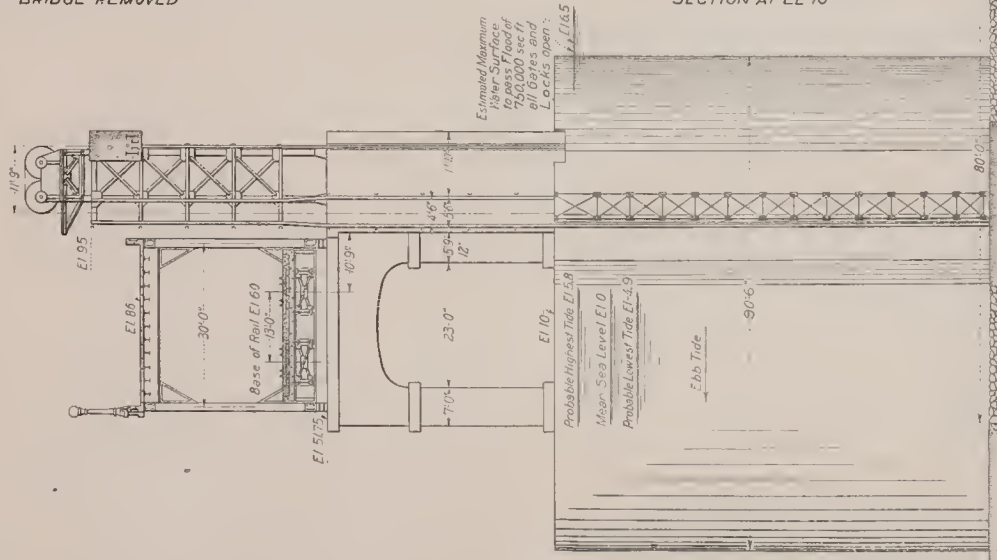
CONTROL WORKS, 70′ x 80′ GATES

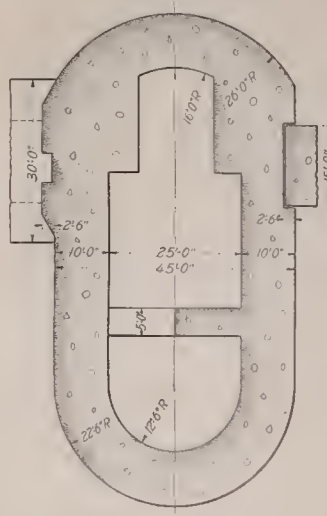
Preliminary Estimate No. 11

Sheet 1 of 3



BRIDGE REMOVED





ABOVE EL -70 BELOW EL -90
HALF SECTIONAL PLANS

Notes-

Maximum Elevation of Base of Rail and lowest Elevation of Bed Rock do not actually occur in the same Section

Sides of Piers to be gunited above low water after removal of Caisson Skin Plates

Caisson Steel which is left in Place in Substructure and Reinforcing Steel in Bridge not shown

Scale

PRELIMINARY DESIGN

APPROVED FOR ESTIMATING PURPOSES:
R. P. Walter
CHIEF ENGINEER

DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS
SALT WATER BARRIER
CONTROL WORKS- 70' x 80' GATE
PRELIMINARY ESTIMATE NO 11

DRAWN C.M.J. C.A.M. SUBMITTED: W.H. Lang
CHECKED N.B.M. RECOMMENDED: J.L. Savage

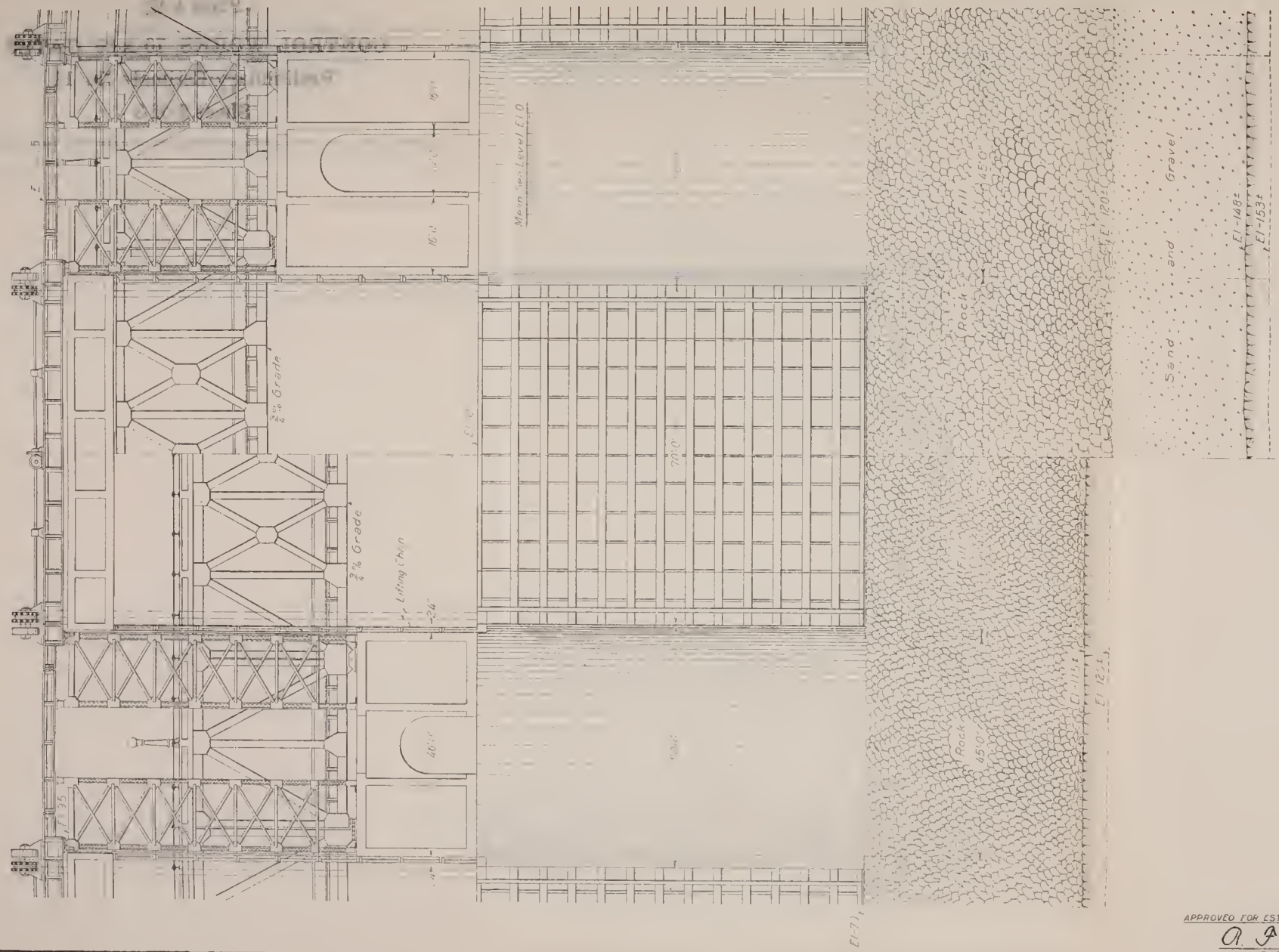
SV-112 | Ellensburg Wash. July 30 1926 | 193-D-64

Plate 4-42

CONTROL WORKS, 70′ x 80′ GATES

Preliminary Estimate No. 11

Sheet 2 of 3



HALF UPSTREAM ELEVATIONS

Notes-
Sides of Piers to be gunited above low Water after removal of Caisson Skin Plates
Caisson Steel which is left in place in Substructure not shown

Scale

PRELIMINARY DESIGN

APPROVED FOR ESTIMATING PURPOSES-
R. F. Walter
CHIEF ENGINEER

DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS
SALT WATER BARRIER
CONTROL WORKS- 70'x 80' GATE
PRELIMINARY ESTIMATE NO 11

DRAWN CMJ CAM SUBMITTED W. P. Young
CHECKED N.B.H. RECOMMENDED O. L. Savage

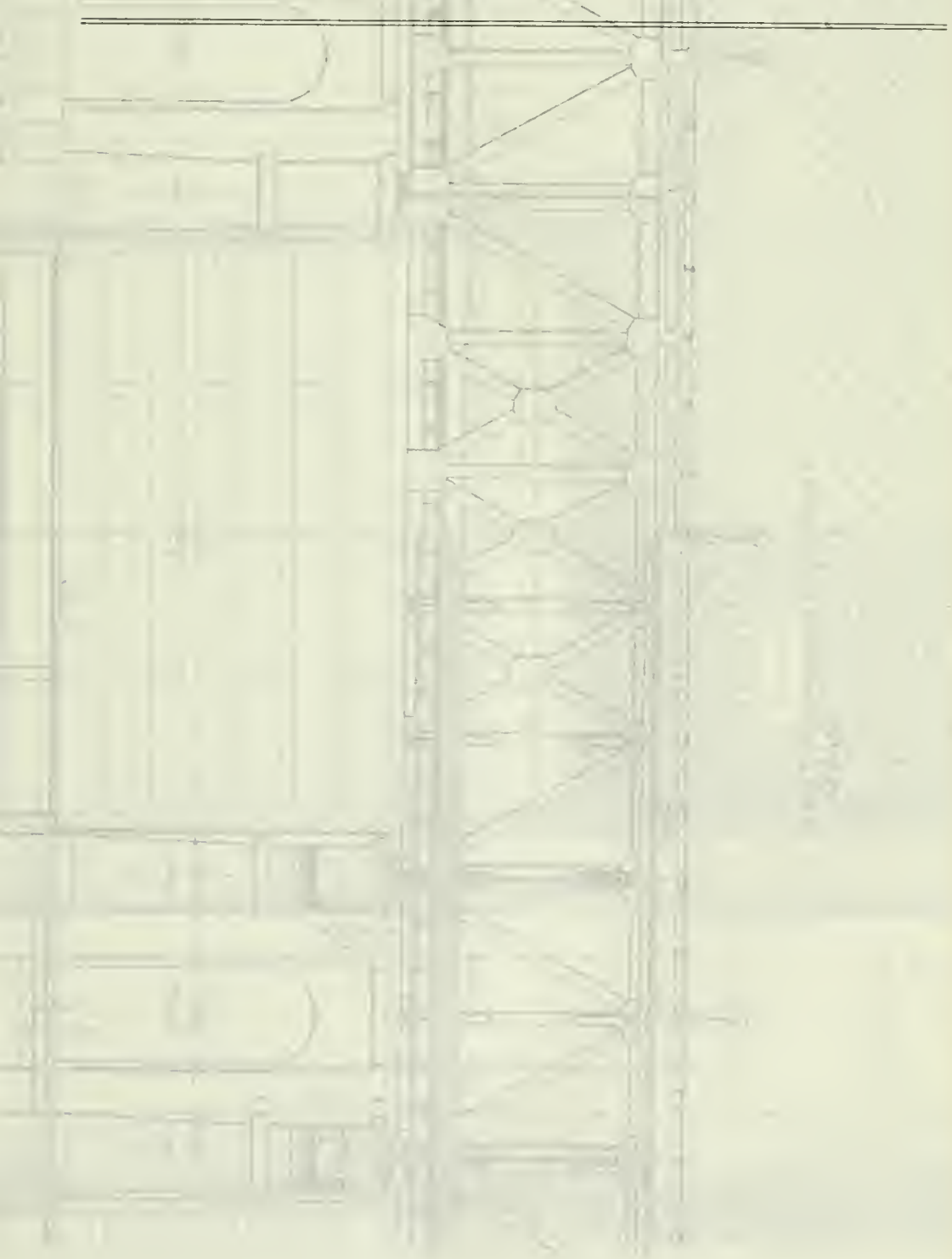
SV-113 | Ellensburg Wash. July 31 1946 Sheet 2 of 3 | 193-D-65

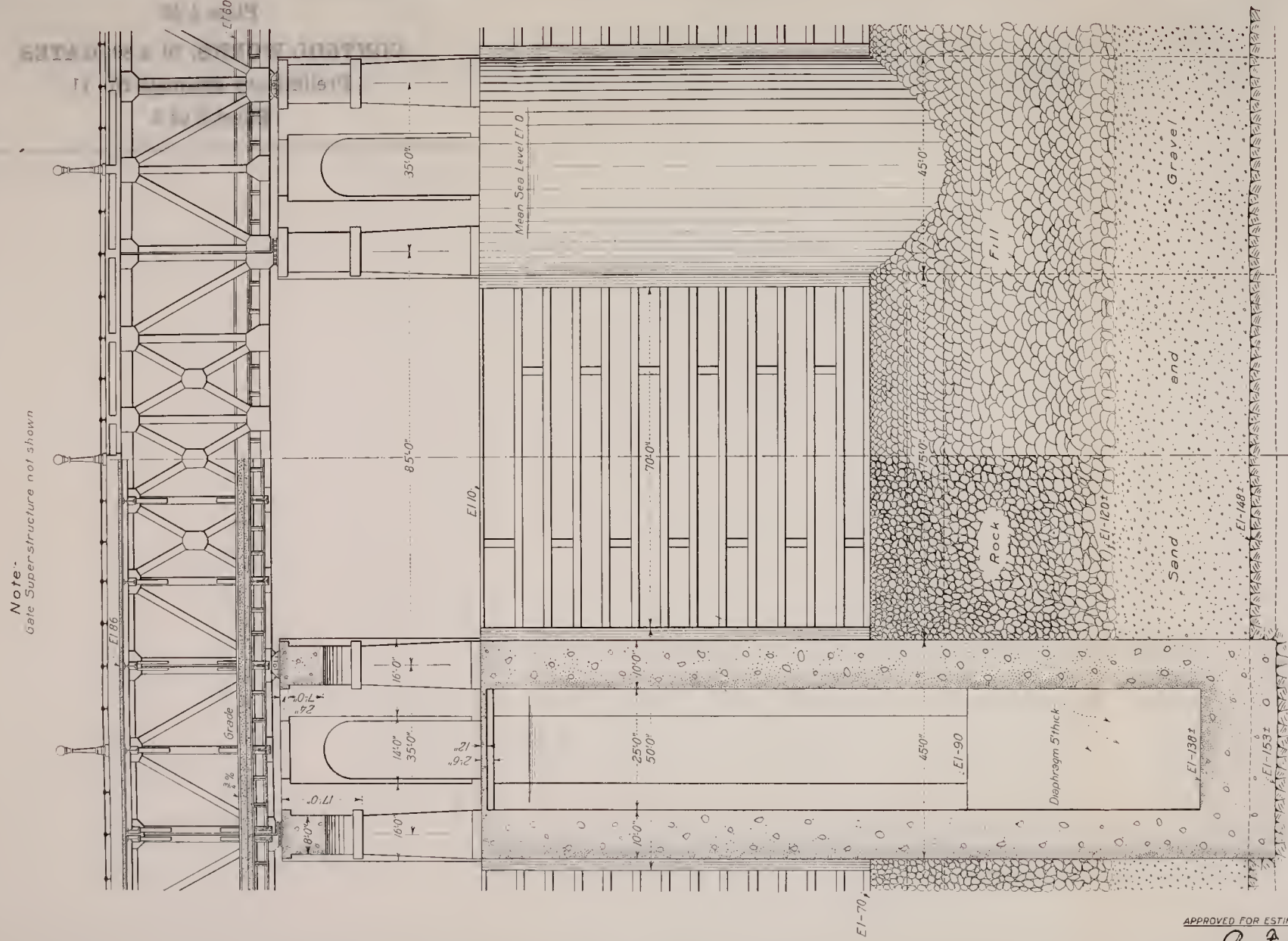
Plate 4-43

CONTROL WORKS, 70′ x 80′ GATES

Preliminary Estimate No. 11

Sheet 3 of 3





HALF SECTIONAL AND DOWNSTREAM ELEVATIONS

Note:-
Gate Superstructure not shown

Notes:-
Maximum Elevation of Base of Rail and lowest Elevation of Bed Rock do not actually occur in the same Section.
Sides of Piers to be gunited above low Water after removal of Caisson Skin Plates.
Caisson Steel which is left in place in Substructure and Reinforcing Steel in Bridge not shown.

Scale

PRELIMINARY DESIGN

APPROVED FOR ESTIMATING PURPOSES:-
A. P. Davis
CHIEF ENGINEER

DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS
SALT WATER BARRIER
CONTROL WORKS- 70'x80' GATE
PRELIMINARY ESTIMATE NO 11

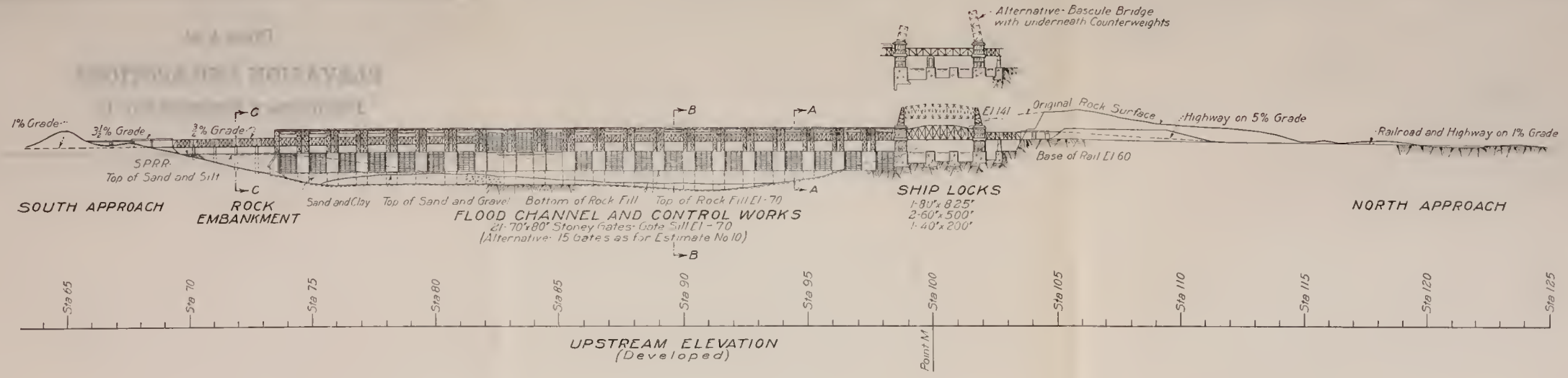
DRAWN C.M.J.-C.A.M. SUBMITTED W.H. Young
CHECKED- N.B.H. RECOMMENDED J.L. Savage

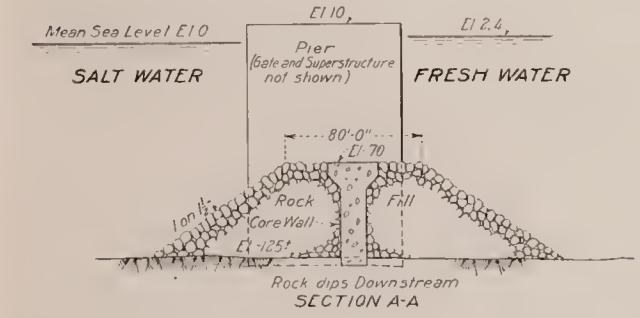
SV-114 | Ellensburg Wash. July 31 1926 Sheet 3 of 3 | 193-D-66

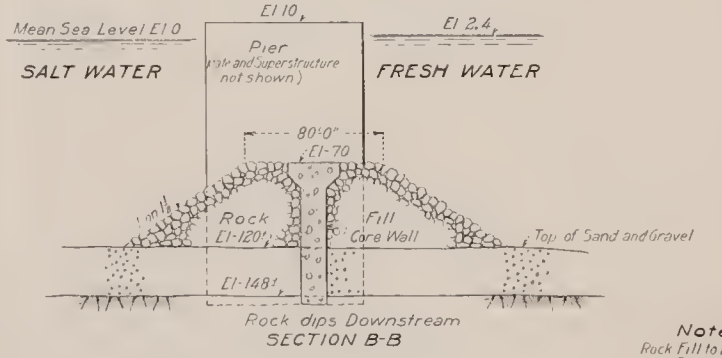
Plate 4-44

ELEVATION AND SECTIONS

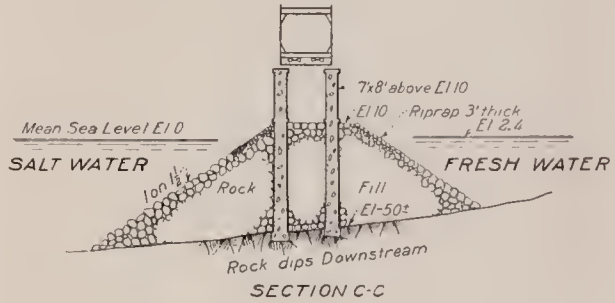
Preliminary Estimate No. 12







EMBANKMENT SECTIONS



Notes:-

Rock Fill to be placed by Bottom Dump Barges up to Maximum Elevation permitted by draft Remainder to be placed by Derrick Barges and Skips

Sections A-A and B-B show Rock Fill deposited around Core Wall under Stoney Gates where action of Current is negligable below El -70

Section C-C shows Embankment placed inside South Cofferdam Alternative Estimate No 12 gives cost with only 15 Flood Gates, located as for Estimate No 10

Scale

PRELIMINARY DESIGN

APPROVED FOR ESTIMATING PURPOSES

A. F. Walter

CHIEF ENGINEER

DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS

SALT WATER BARRIER
ELEVATION AND SECTIONS
PRELIMINARY ESTIMATE NO 12

DRAWN: C.M.J. LTF. CAM SUBMITTED: W.K. Young
CHECKED: N.B.H. RECOMMENDED: J.L. Savage

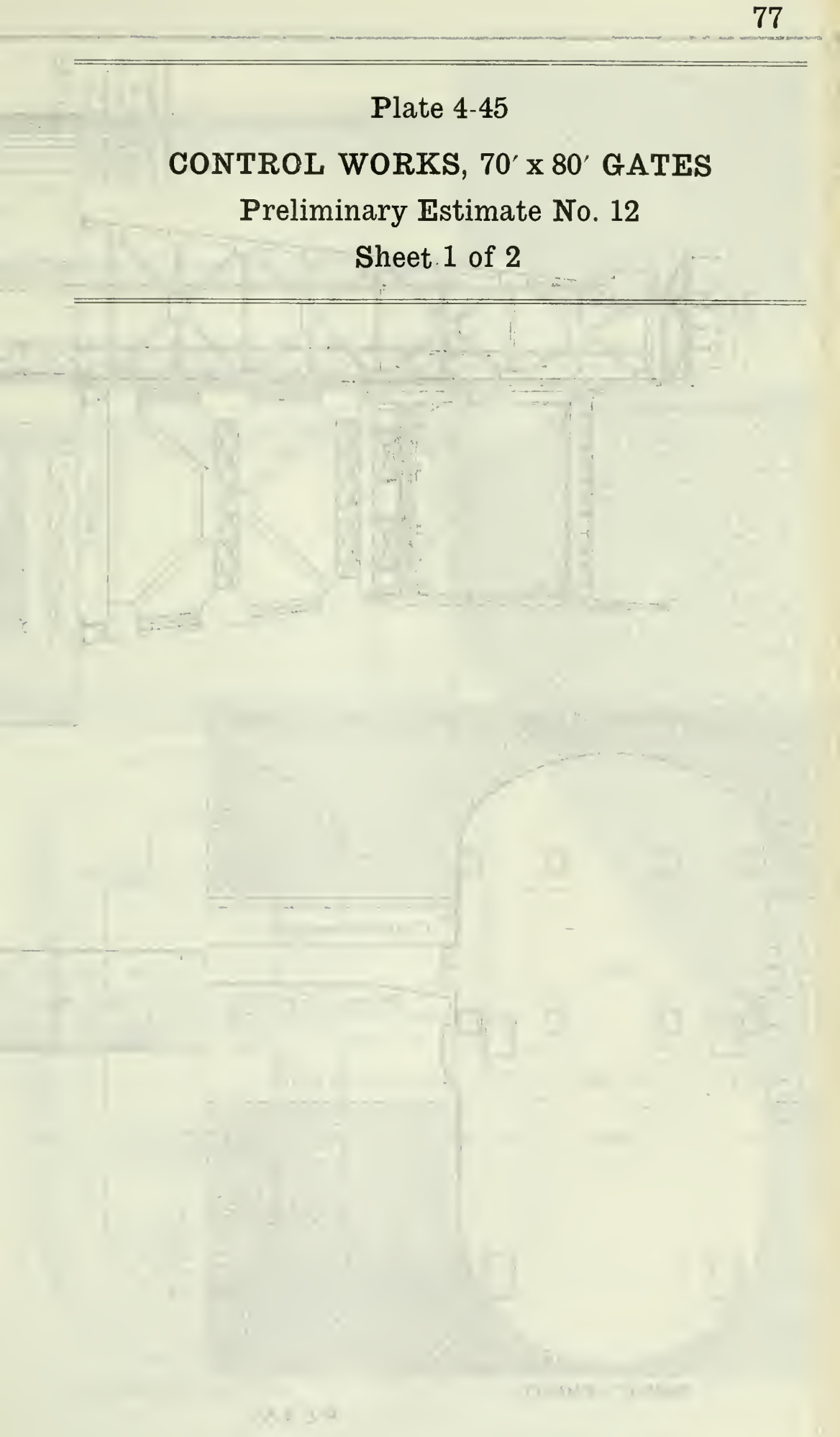
SV-115	Ellensburg, Wash. July 19, 1926	193-D-67

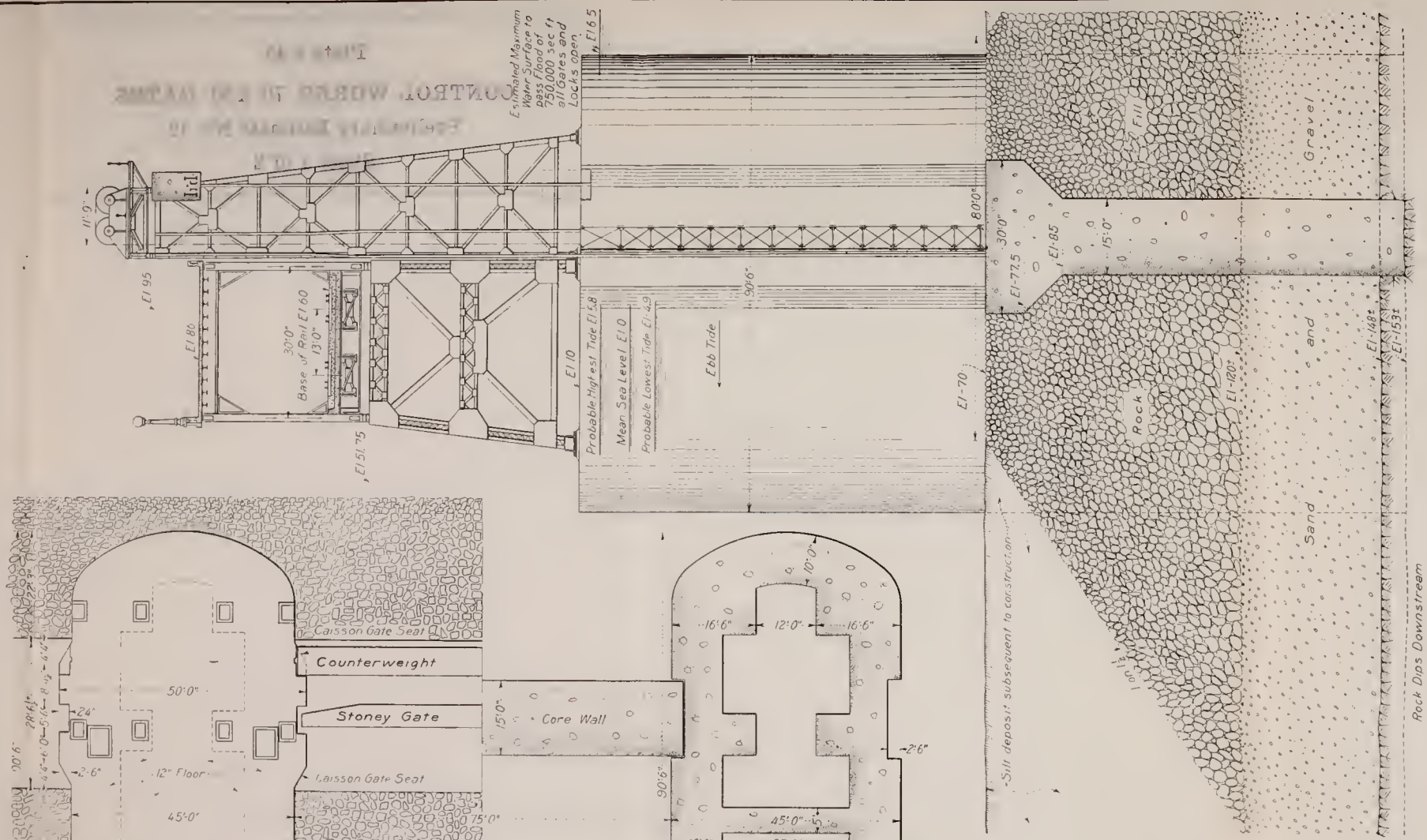
Plate 4-45

CONTROL WORKS, 70′ x 80′ GATES

Preliminary Estimate No. 12

Sheet 1 of 2





Notes:-

Control Works for Estimate No 10 are as shown on this Drawing except for omission of Railroad and Highway Bridge

Maximum Elevation of Base of Rail and lowest Elevation of Bed Rock do not actually occur in the same Section

Sides of Piers to be gunited above low Water after removal of Caisson Skin Plates

Caisson Steel which is left in place in Substructure and Reinforcing Steel in Bridge not shown

Scale

PRELIMINARY DESIGN

APPROVED FOR ESTIMATING PURPOSES:
A. F. Walter
CHIEF ENGINEER

DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS
SALT WATER BARRIER
CONTROL WORKS-70'x80' GATE
PRELIMINARY ESTIMATE NO 18

DRAWN CMJ-CAM SUBMITTED W.K. Young
CHECKED NBH RECOMMENDED J.L. Savage

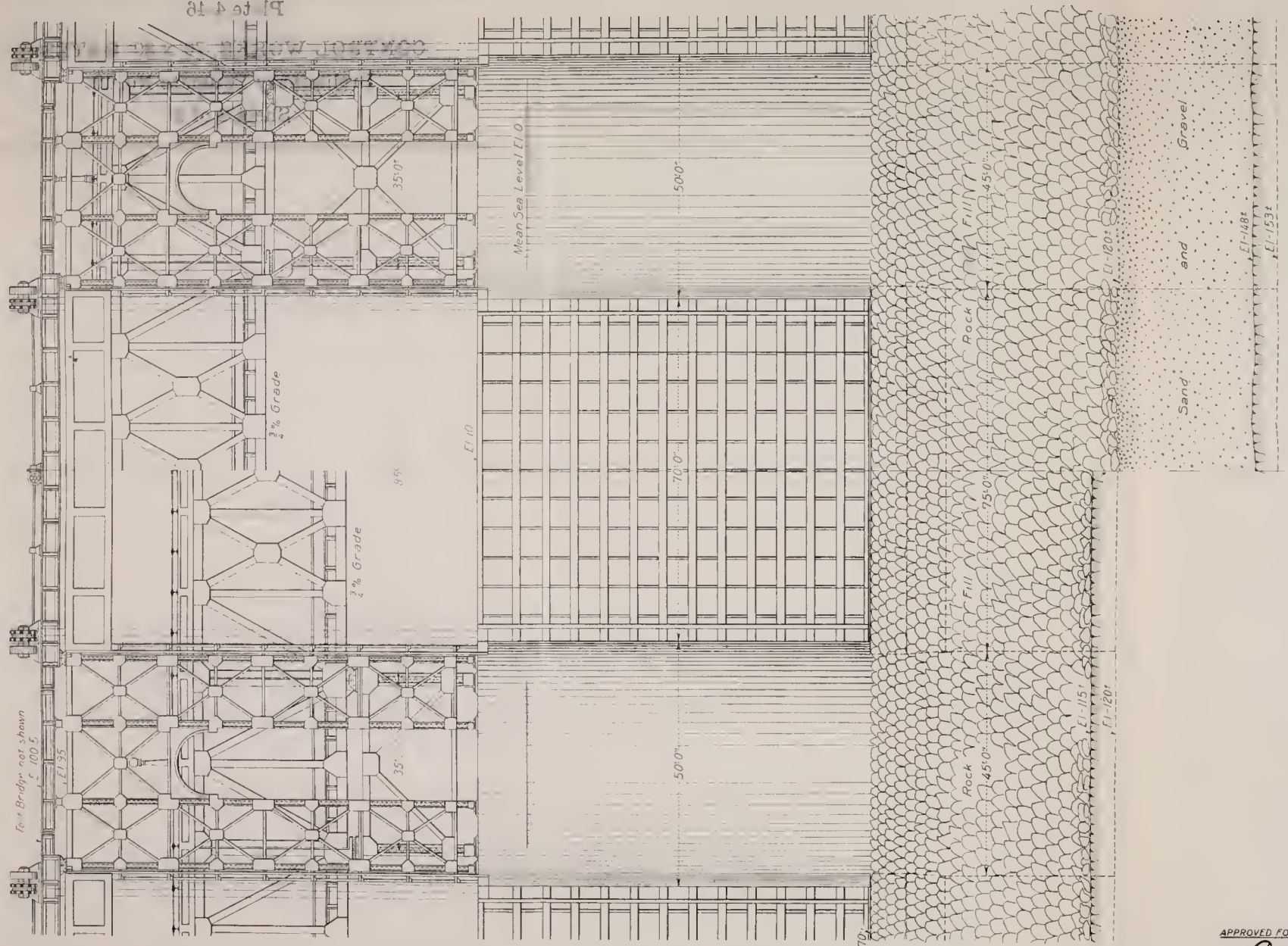
SV-116 | Ellensburg Wash. July 19, 1926 Sheet 1 of 2 | 193-D-68

Plate 4-46

CONTROL WORKS, 70′ x 80′ GATES

Preliminary Estimate No. 12

Sheet 2 of 2



HALF UPSTREAM ELEVATIONS

Notes:-

Control Works for Estimate No 10 are as shown on this Drawing except for omission of Railroad and Highway Bridge

Sides of Piers to be gunited above low Water after removal of Caisson Skin Plates

Caisson Steel which is left in place in Sub structure not shown

Scale

PRELIMINARY DESIGN

APPROVED FOR ESTIMATING PURPOSES

A. P. Walter
CHIEF ENGINEER

DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS
SALT WATER BARRIER
CONTROL WORKS - 70' x 80' GATE
PRELIMINARY ESTIMATE NO. 12

DRAWN C.M.J.-C.A.M. SUBMITTED W. H. Young
CHECKED N.B.H. RECOMMENDED J. L. Savage

SV-117 | Ellensburg Wash. Aug. 2, 1926 Sheet 2 of 12 | 193-D-69

Plate 4-47

DILLON POINT SITE, GENERAL LAYOUT

Preliminary Estimate No. 13

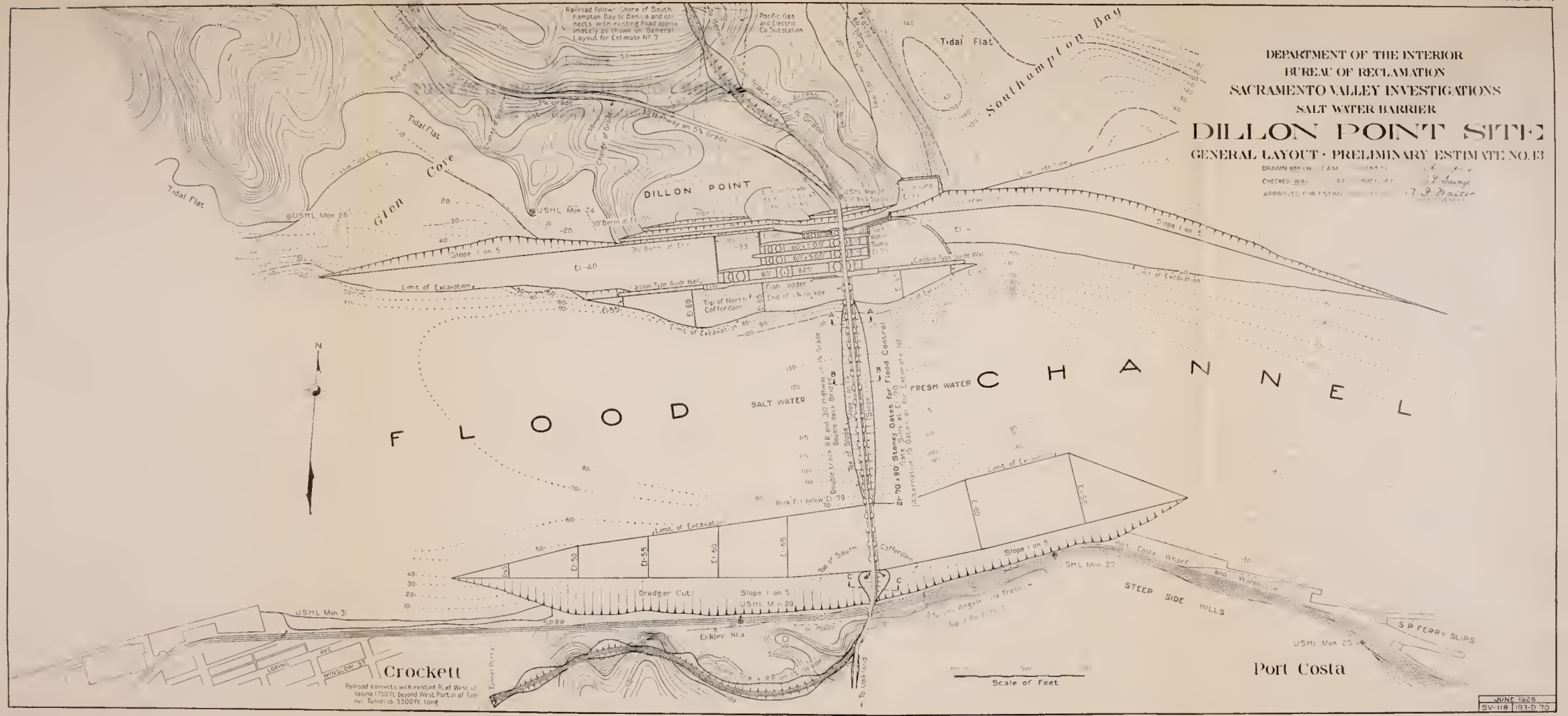
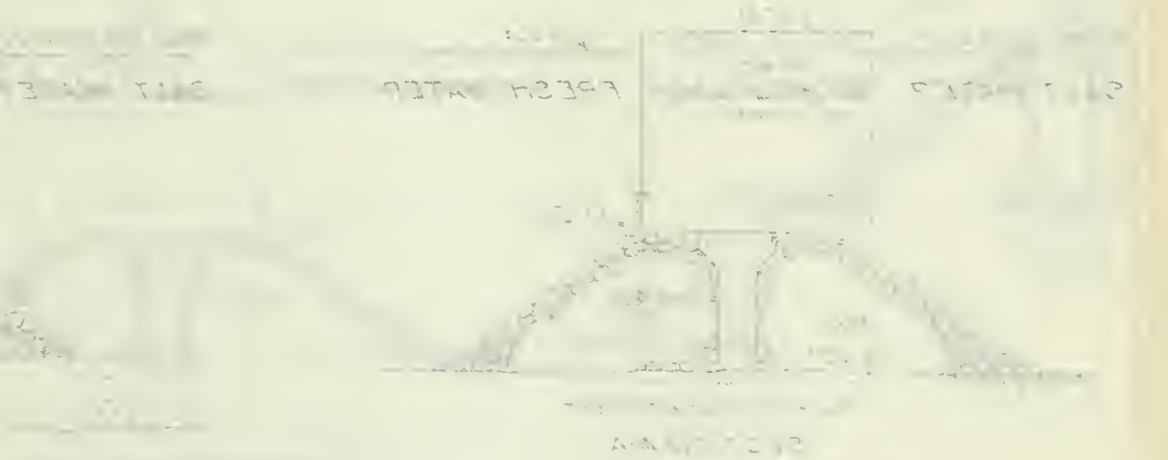
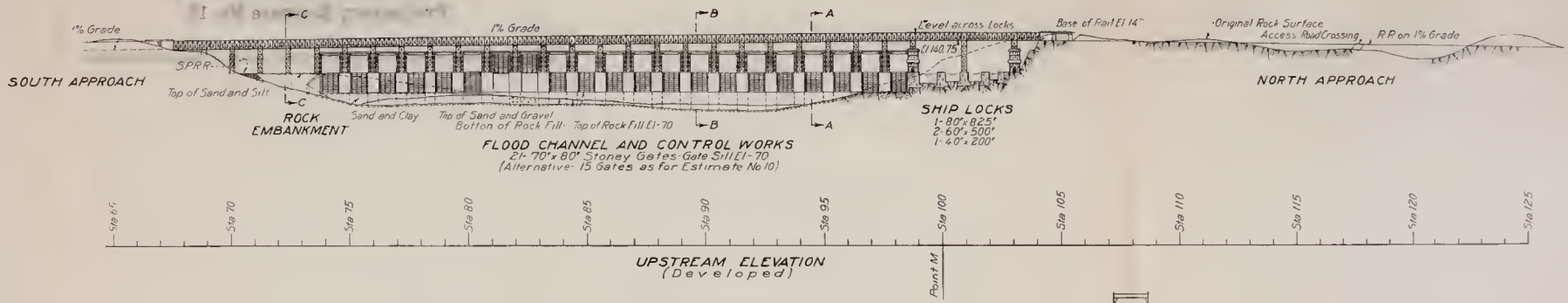

DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS
SALT WATER BARRIER
DILLON POINT SITE
GENERAL LAYOUT - PRELIMINARY ESTIMATE NO. E3
DRAWN
CHECKED
APPROVED FOR ESTIMATE
Railroad follows shore of Southampton Bay to Benicia and connects with existing Road approximately as shown on General Layout for Estimate No. 7
Pacific Gas and Electric Co Substation
Tidal Flat
Southampton Bay
Glen Cove
DILLON POINT
30' Highway on 5% Grade
Change of Grade
USHL Mon 26
USHL Mon 24
USHL Mon 28
30' Berm at El 70
Slope 1 on 5
Slope 1 on 6
El-40
Limit of Excavation
Caisson Type Guide Wall
Fish adder
Top of North Cofferdam
End of 3% Inside
Water Sump
FLOOD CHANNEL
SALT WATER
FRESH WATER
N
Double Track RR and 30' Highway on 1% Grade
Double deck Bridge
Top of South Cofferdam
21-70 x 80' Stoney Gates for Flood Control
Rock Fill below El -70
Dredger Cut
Slope 1 on 5
USHL Mon 29
USHL Mon 27
Costa Wharf and Wires
STEEL SIDE HILLS
S P FERRY SLIPS
USHL Mon 25
USHL Mon 31
S P R R
Erkley Rd
Crockett
Railroad connects with existing R.R at West of Valona 1750 ft. beyond West Portal of Tunnel. Tunnel is 3300 ft. long
Port Costa
Scale of Feet
JUNE 1926
SV-118 193-D 70

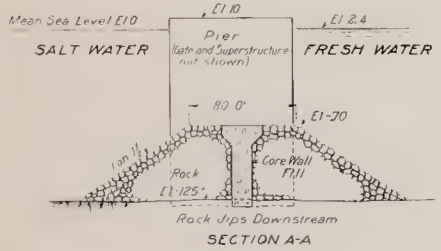
Plate 4-48

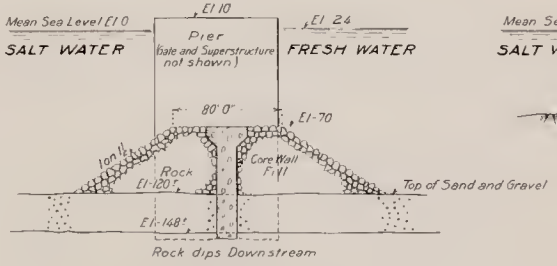
ELEVATION AND SECTIONS

Preliminary Estimate No. 13

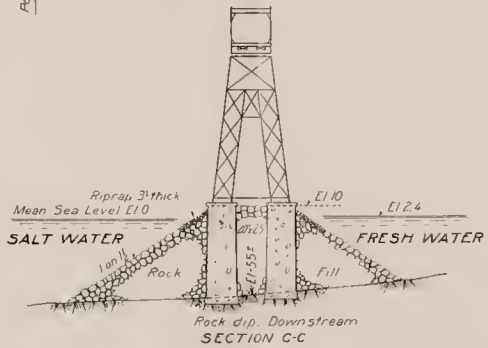








EMBANKMENT SECTIONS



Notes -

Rock Fill to be placed by Bottom Dump Barges up to Maximum Elevation permitted by draft Remainder to be placed by Derrick Barges and Skips

Section A-A and B-B show Rock Fill to be deposited around Core Wall under Stoney Gates where action of current is negligible below El-70

Section C-C shows Embankment placed inside of South Cofferdam

Alternative Estimate No 13 gives Cost with only 15 Flood Gates, located as for Estimate No 10

Scale

PRELIMINARY DESIGN

DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS

SALT WATER BARRIER
ELEVATION AND SECTIONS
PRELIMINARY ESTIMATE NO 13

DRAWN C.M.J.
TR C.A.M. SUBMITTED C.H. Lee Young
CHECKED M.D.H. RECOMMENDED O.E. Savage

SV-119 | Ellensburg Wash July 23 1926 | 193-D-71

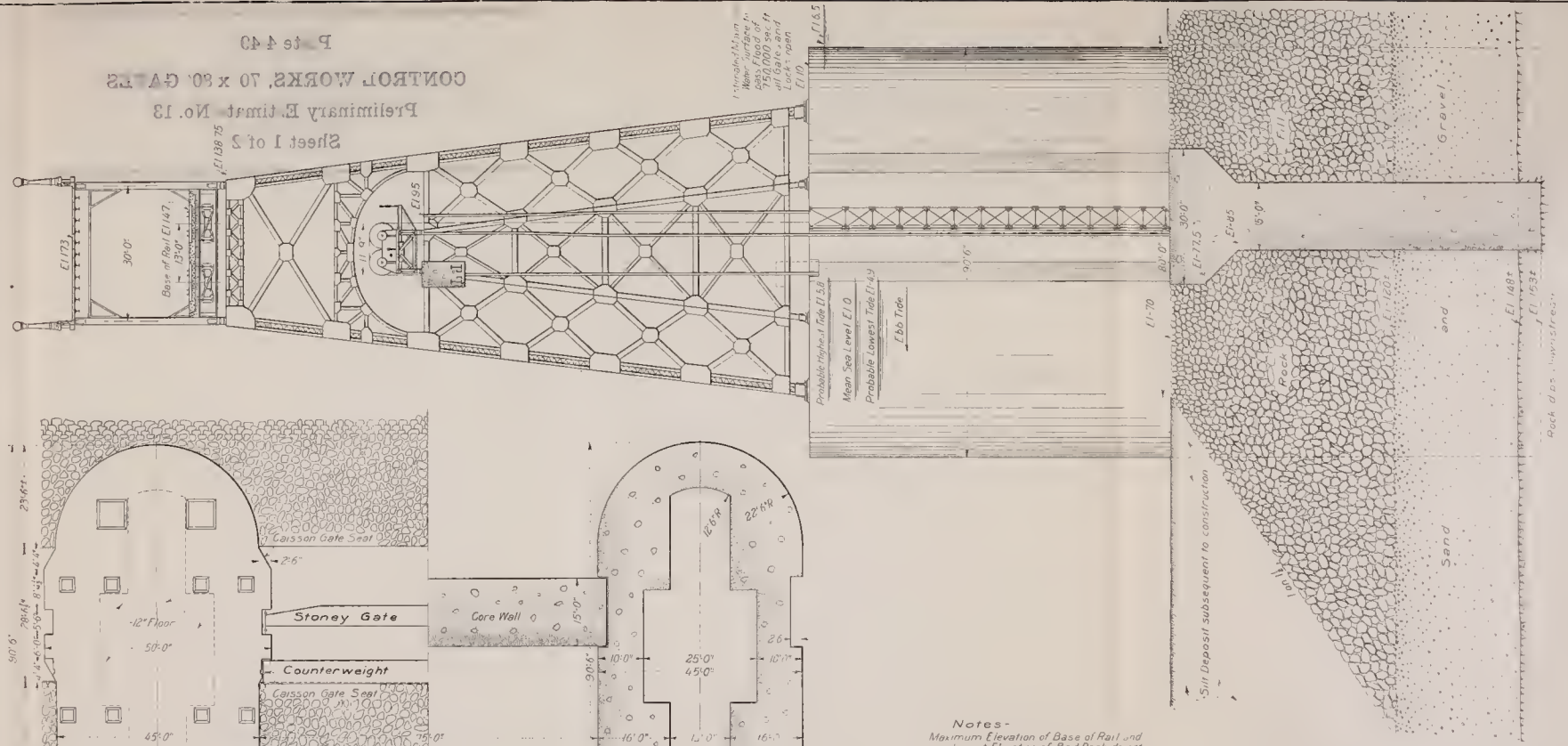
APPROVED FOR ESTIMATING PURPOSES:
A. P. Walter
CHIEF ENGINEER

Plate 4-49

CONTROL WORKS, 70′ x 80′ GATES

Preliminary Estimate No. 13

Sheet 1 of 2



Notes-

Maximum Elevation of Base of Rail and lowest Elevation of Bed Rock do not actually occur in the same Section

Sides of Piers to be gunited above low Water after removal of Caisson Skin Plates

Caisson Steel which is left in place in Substructure and Reinforcing Steel in Bridge not shown

Scale

PRELIMINARY DESIGN

DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS
SALT WATER BARRIER
CONTROL WORKS- 70' x 80' GATE
PRELIMINARY ESTIMATE NO 13

DRAWN CMJ-CAM SUBMITTED
CHECKED NBH RECOMMENDED

APPROVED FOR ESTIMATING PURPOSES
A. P. Walter
CHIEF ENGINEER

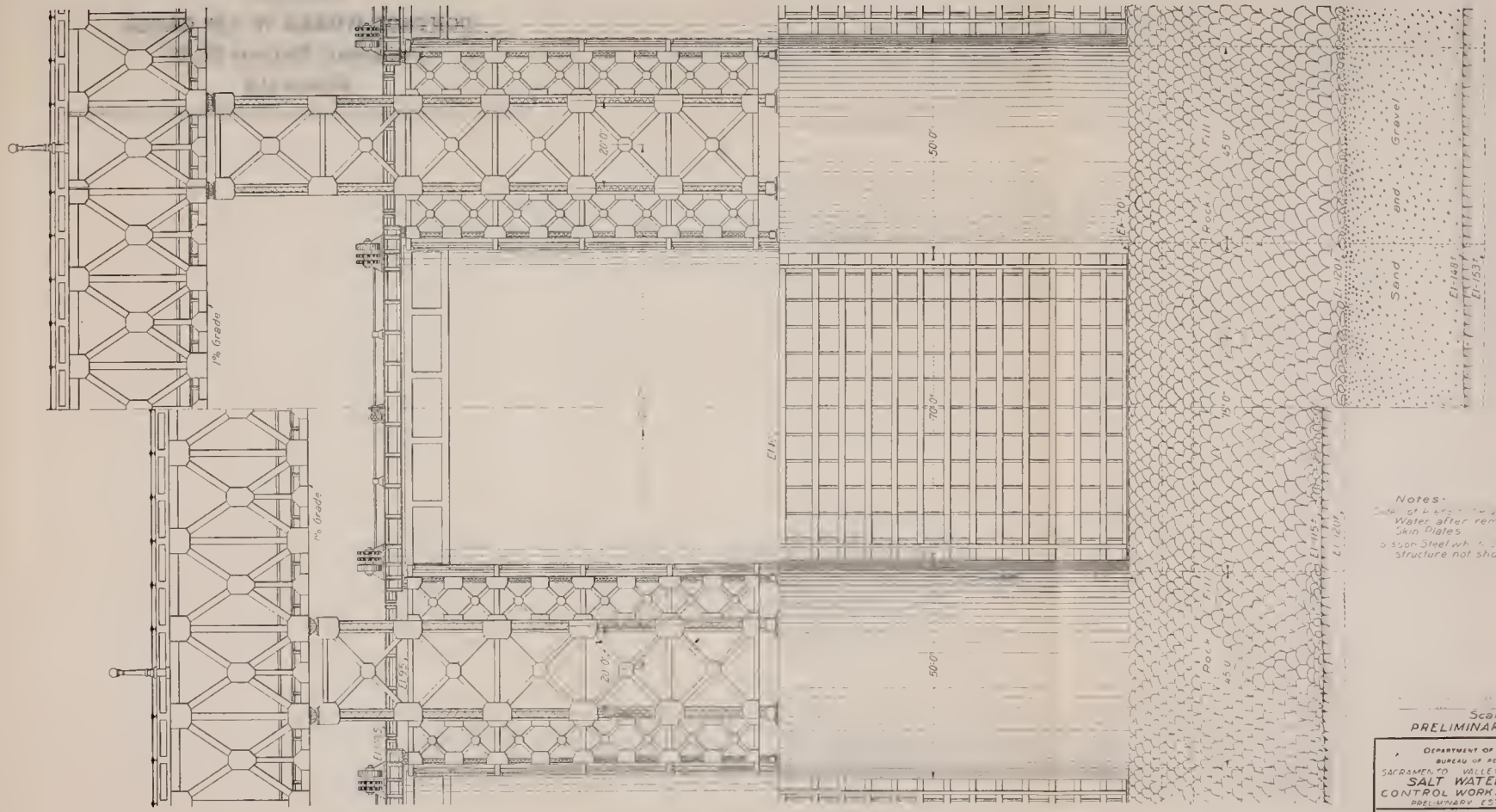
SV-120 | Ellensburg Wash July 24 1940 | Sheet 1 of 2 | 193-D-72

Plate 4-50

CONTROL WORKS, 70′ x 80′ GATES

Preliminary Estimate No. 13

Sheet 2 of 2



Notes:
Water after removal
Skin Plates
Structure not shown

Scale
PRELIMINARY DESIGN

APPROVED FOR ESTIMATING PURPOSES
A. P. Walter
CHIEF ENGINEER

DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS
SALT WATER BARRIER
CONTROL WORKS-70'x80' GATE
PRELIMINARY ESTIMATE NO. 13

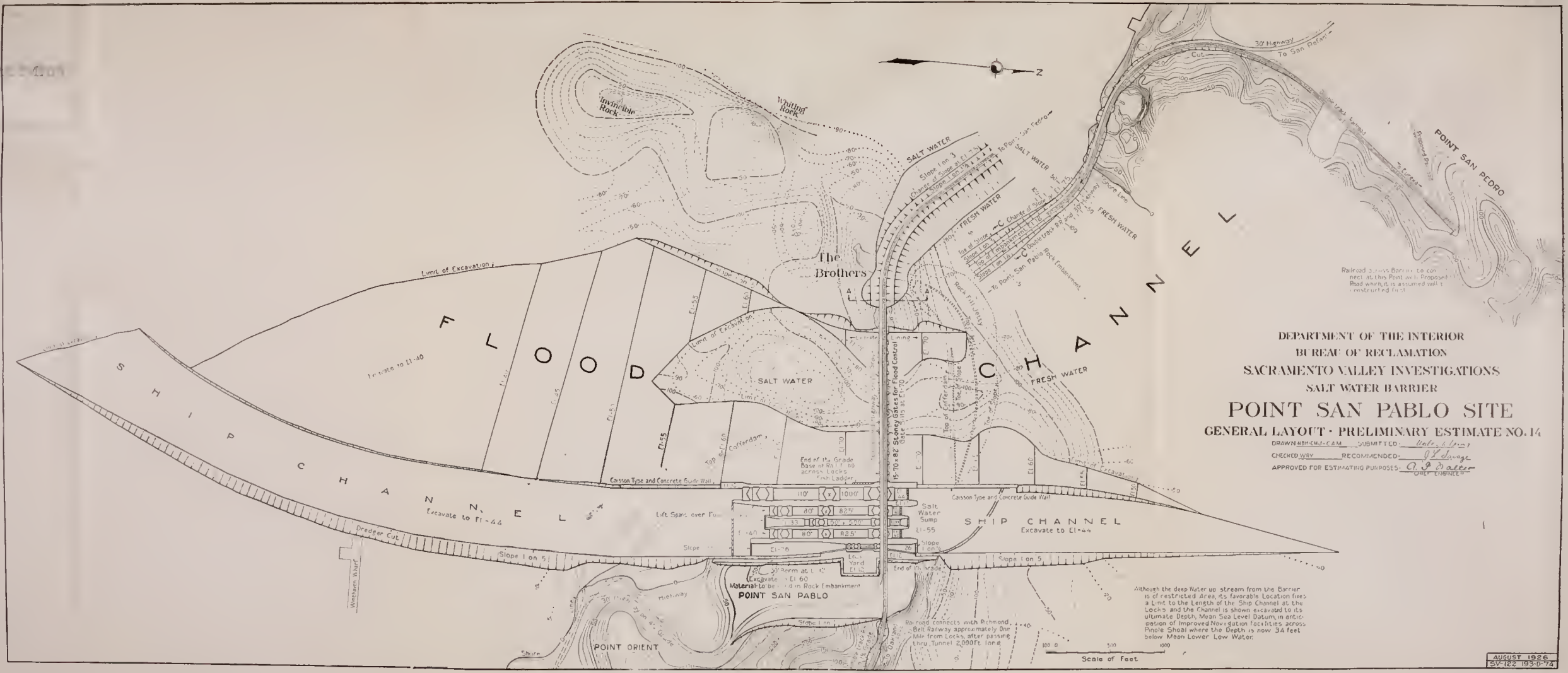
DRAWN J.M. TRACED B.W. SUBMITTED W. Kilpatrick
CHECKED N.B.M. RECOMMENDED L. E. Stroger

SV-121 | 193-D-73

Plate 4-51

POINT SAN PABLO SITE, GENERAL LAYOUT

Preliminary Estimate No. 14


Invincible Rock
Whaling Rock
The Brothers
SALT WATER
FRESH WATER
To Port San Pedro
30' Highway
To San Rafael
Cut
Shore Line
POINT SAN PEDRO
Railroad Cross Barrier to connect at this Point with Proposed Road which it is assumed will be constructed first
Limit of Excavation
Slope 1 on 3
Slope 1 on 5
Slope 1 on ½
Slope 1 on 1
Slope 1 on 2
Slope 1 on 10
Change of Slope
Top of Slope
Top of Embankment
Toe
Top of Cofferdam
Rock Fill Jetty
Rock Fill Dike
Caisson Type and Concrete Guide Wall
End of 1% Grade
Base of Rock Fill for Locks
Fish Ladder
15-70 x 82' Stoney Gates for Flood Control
Gate Sill El -70
Salt Water Sump
El -55
El -60
El -36
El -40
Fl -55
Fl -60
Fl -70
Excavate to El -60
Material to be used in Rock Embankment
POINT SAN PABLO
POINT ORIENT
Excavate to El -44
Excavate to Fl -44
Dredger Cut
Wharf
Railroad connects with Richmond-Belt Railway approximately One Mile from Locks, after passing thru Tunnel 2,000 Ft long
Although the deep water up stream from the Barrier is of restricted Area, its favorable Location fixes a Limit to the Length of the Ship Channel at the Locks and the Channel is shown excavated to its ultimate Depth, Mean Sea Level Datum, in anticipation of Improved Navigation facilities across Pinole Shoal where the Depth is now 34 feet below Mean Lower Low Water.
Scale of Feet
SHIP CHANNEL
FLOOD CHANNEL

DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS
SALT WATER BARRIER

POINT SAN PABLO SITE

GENERAL LAYOUT · PRELIMINARY ESTIMATE NO. 14

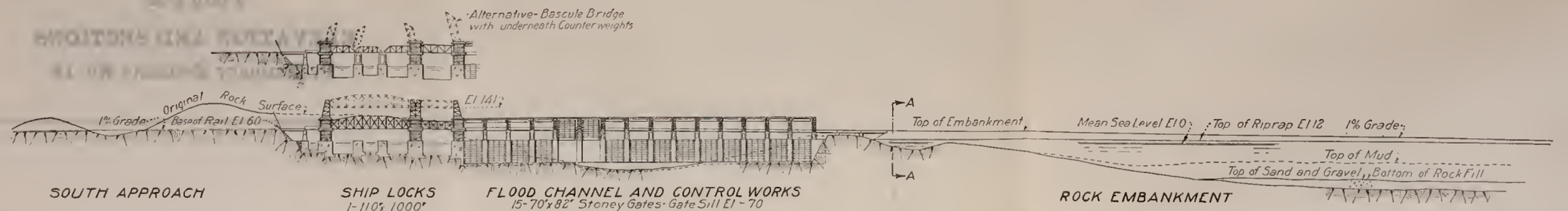
DRAWN NBH-CMJ-CAM SUBMITTED: Water & Power
CHECKED WRY RECOMMENDED: O.L. Savage
APPROVED FOR ESTIMATING PURPOSES: A. P. Potter
CHIEF ENGINEER

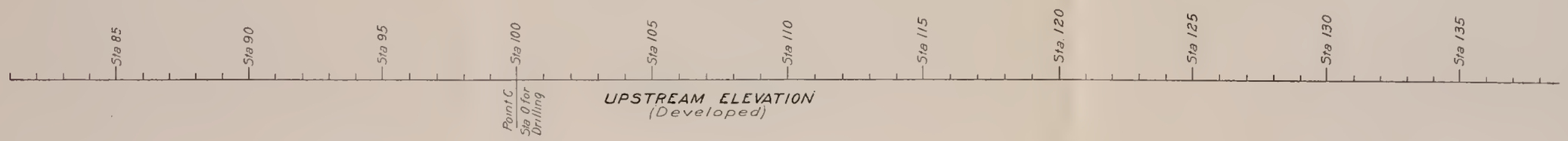
AUGUST 1926
SV-122 193-D-74

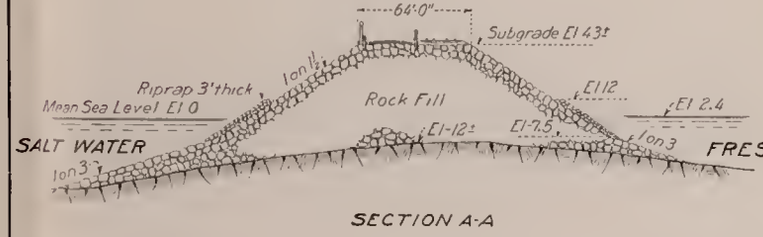
Plate 4-52

ELEVATION AND SECTIONS

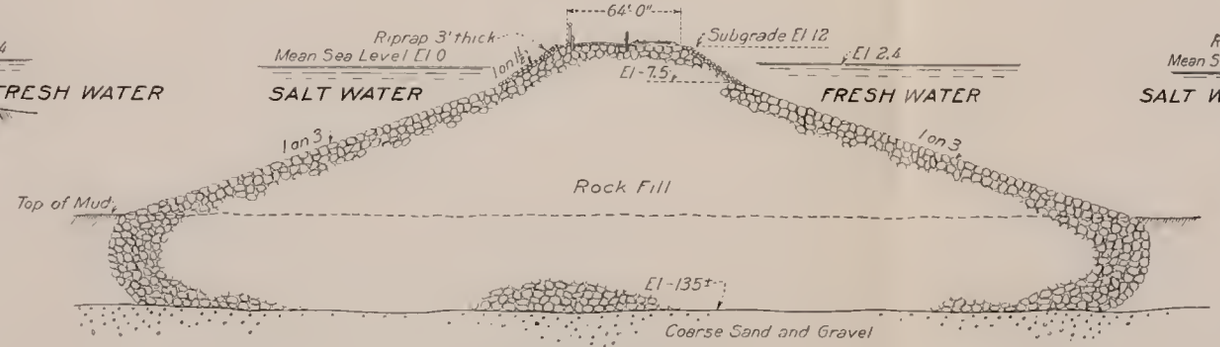
Preliminary Estimate No. 14



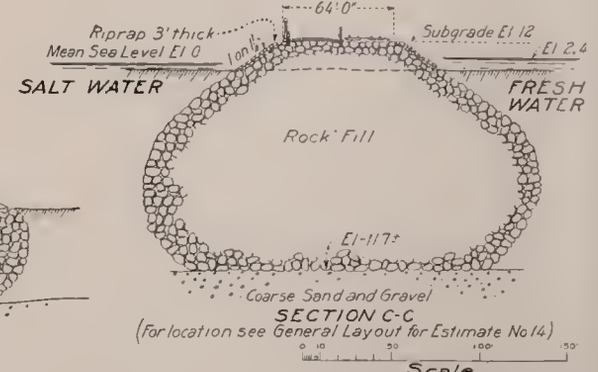




SECTION A-A



SECTION B-B
(Opposite Drill Hole 4500)



SECTION C-C
(For location see General Layout for Estimate No 14)

Scale

EMBANKMENT SECTIONS

Notes-
Rock Fill to be placed by Bottom Dump Barges up to Maximum Elevation permitted by draft Remainder to be placed by Derrick Barges and Skips

PRELIMINARY DESIGN

APPROVED FOR ESTIMATING PURPOSES
A. P. Walter
CHIEF ENGINEER

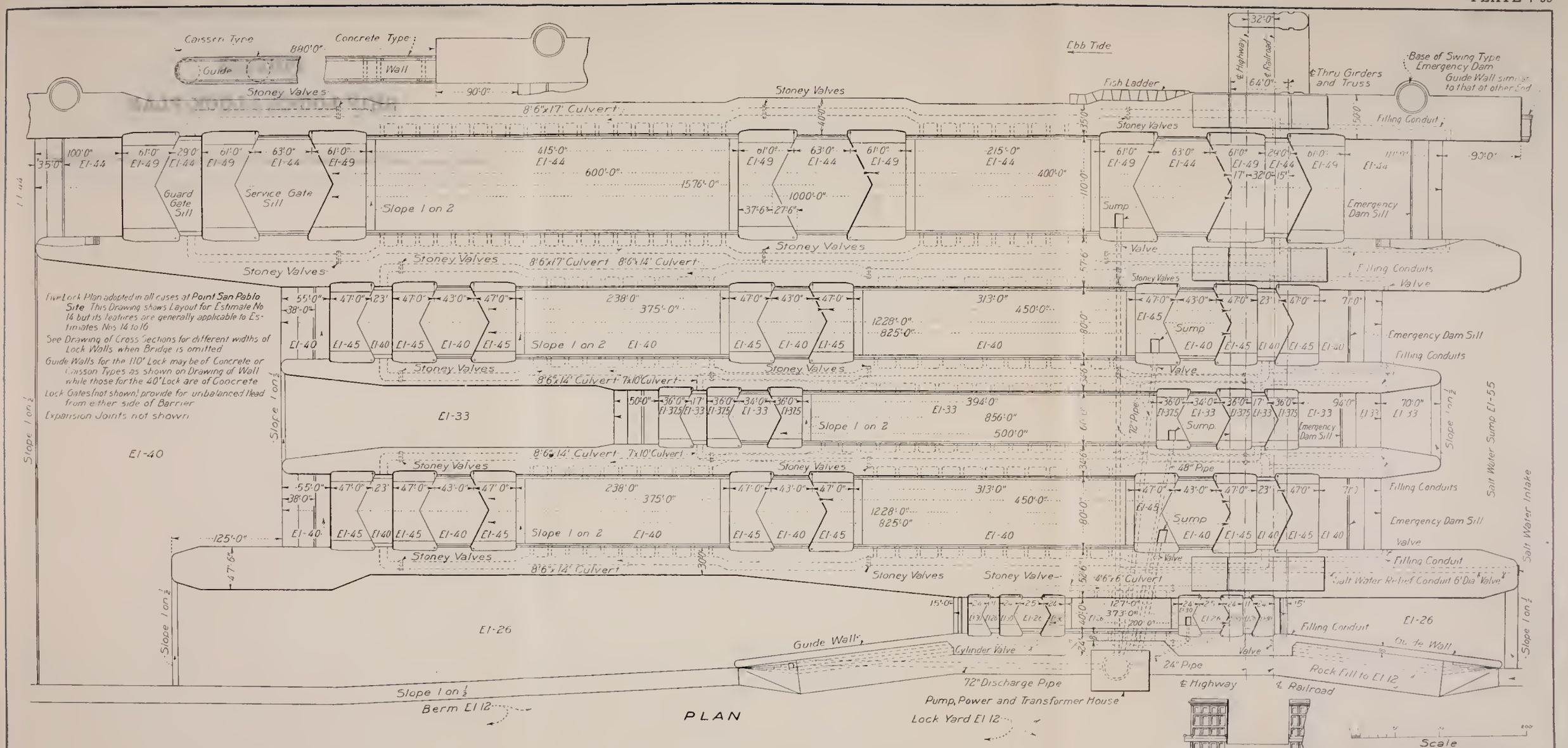
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS
SALT WATER BARRIER
ELEVATION AND SECTIONS
PRELIMINARY ESTIMATE NO 14

DRAWN: C.M.J.-L.T.F.-C.A.M. SUBMITTED W.K. Young
CHECKED N.B.H. RECOMMENDED J.L. Savage

SV-123 | Ellensburg Wash. Aug 12, 1926 | 193-D-75

Plate 4-53

SHIP LOCKS, 5-LOCK PLAN



Five Lock Plan adopted in all cases at **Point San Pablo Site** This Drawing shows Layout for Estimate No 14 but its features are generally applicable to Estimates Nos 14 to 16

See Drawing of Cross Sections for different widths of Lock Walls when Bridge is omitted

Guide Walls for the 110' Lock may be of Concrete or Caisson Types as shown on Drawing of Wall while those for the 40' Lock are of Concrete

Lock Gates(not shown) provide for unbalanced Head from either side of Barrier

Expansion Joints not shown

DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS

SALT WATER BARRIER
SHIP LOCKS-LAYOUT
PRELIMINARY ESTIMATES NOS 14 TO 16

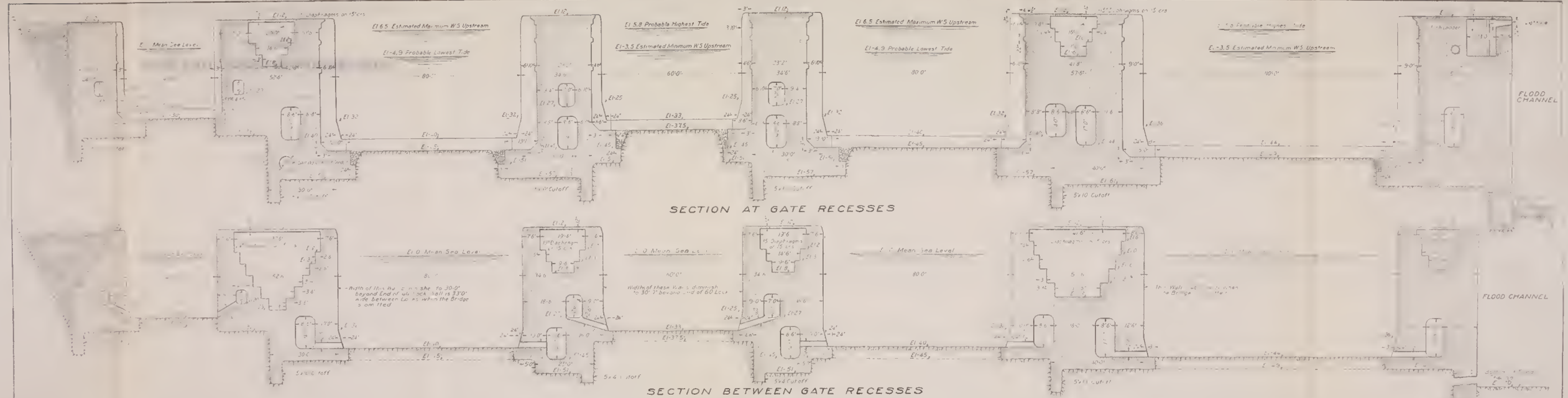
DRAWN G.N.J. TRACED A.M. SUBMITTED J.L. Kittering
CHECKED N.B.H. RECOMMENDED: J.E. Savage

APPROVED FOR ESTIMATING PURPOSES
A. P. Walter
CHIEF ENGINEER

SV-124 | Ellensburg Wash. Aug. 7 1926 | 193-D-76

Plate 4-54

CROSS SECTIONS OF LOCKS, 5-LOCK PLAN


El 6.5 Estimated Maximum W.S. Upstream
El -4.9 Probable Lowest Tide
El 5.8 Probable Highest Tide
El -3.5 Estimated Minimum W.S. Upstream
Mean Sea Level
FLOOD CHANNEL
5'x10' Cutoff
5'x4' Cutoff
SECTION AT GATE RECESSES
El 0 Mean Sea Level
Width of this wall is 330' beyond end of lock wall
Widths of these walls diminish to 30'-1" beyond end of 60' Locks
SECTION BETWEEN GATE RECESSES
Scale

Notes -

Five Lock Plan adopted for Point San Pablo Site This Drawing shows Sections for Estimate No 1a but its features are general, applicable to Estimates Nos 1A & 1B

When Bridge is provided the 60' Lock and both 80' Locks are crossed by a Lift Span 314' long and the 110' Lock by a Lift Span 314' long The arrangement of Ends of Lift Spans is similar to that for the Three Lock Plan The clearance is the same

Reinforcing Steel not shown In salt Water same to be 12" from face of Concrete

Lock Gates not shown

PRELIMINARY DESIGN

DEPARTMENT OF THE ARMY
CORPS OF ENGINEERS
SACRAMENTO, CALIFORNIA

SALT WATER BARRIER
SHIP LOCKS - CROSS SECTIONS
PRELIMINARY ESTIMATE NOS 1A & 1B

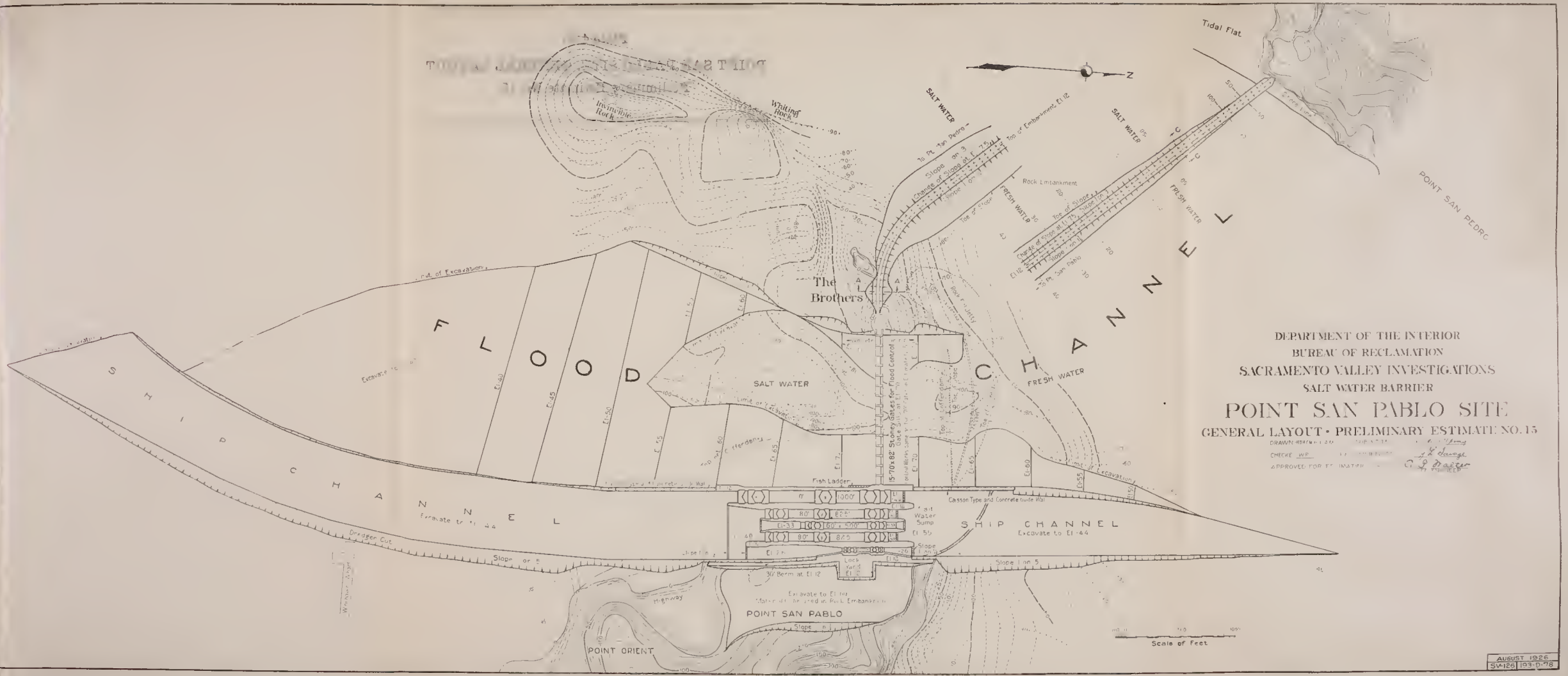
APPROVED FOR DISTRICT ENGINEER:
A. F. Baker
Lt. Colonel, Corps of Engineers

SV-125

Plate 4-55

POINT SAN PABLO SITE, GENERAL LAYOUT

Preliminary Estimate No. 15



DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS
SALT WATER BARRIER

POINT SAN PABLO SITE

GENERAL LAYOUT • PRELIMINARY ESTIMATE NO. 15

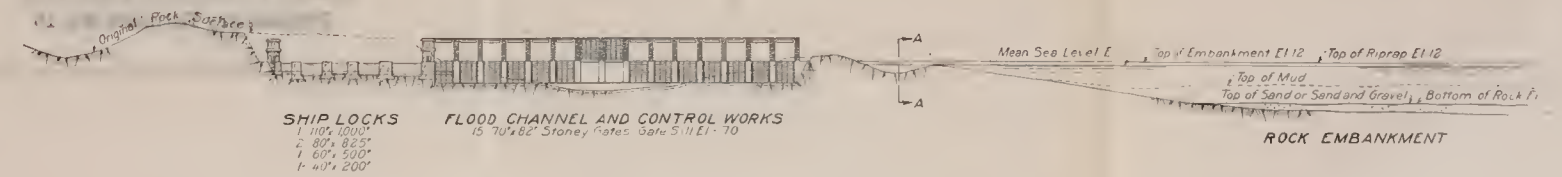
DRAWN WP
CHECKED WP
APPROVED FOR ESTIMATE

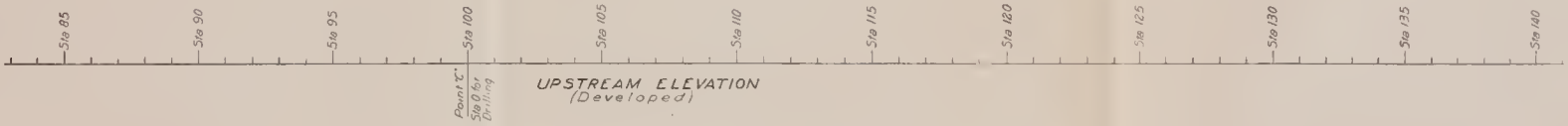
AUGUST 1926
SV-126 | 103-D-78

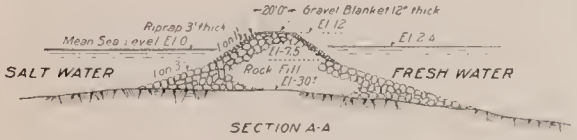
Plate 4-56

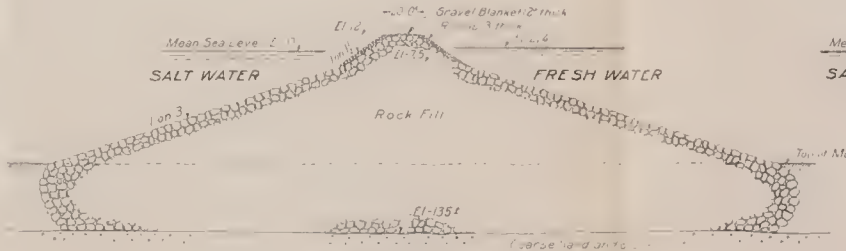
ELEVATION AND SECTIONS

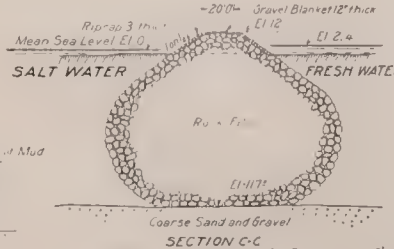
Preliminary Estimate No. 15


Original Rock Surface
A
A
Mean Sea Level E
Top of Embankment El 12
Top of Riprap El 12
Top of Mud
Top of Sand or Sand and Gravel
Bottom of Rock Fi
SHIP LOCKS
1- 110' x 1000'
2- 80' x 825'
1- 60' x 500'
1- 40' x 200'
FLOOD CHANNEL AND CONTROL WORKS
15 70' x 82' Stoney Gates Gate Sill El - 70
ROCK EMBANKMENT









Notes -
Rock Fill to be placed by Bottom Dump Barges up to Maximum Elevation permitted by draft Remainder to be placed by Derrick Barges and Skips

EMBANKMENT SECTIONS

Scale

PRELIMINARY DESIGN

DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS
SALT WATER BARRIER
ELEVATION AND SECTIONS
PRELIMINARY ESTIMATE NO 15

DRAWN C.M.J.T.F. C.A.M. SUBMITTED
CHECKED N.B.M. RECOMMENDED

SV-127 | Ellensburg Wash. Aug 14 1926 | 193-D-79

APPROVED FOR ESTIMATING PURPOSES
A. P. Walter
CHIEF ENGINEER

Plate 4-57

POINT SAN PABLO SITE, GENERAL LAYOUT

Preliminary Estimate No. 16

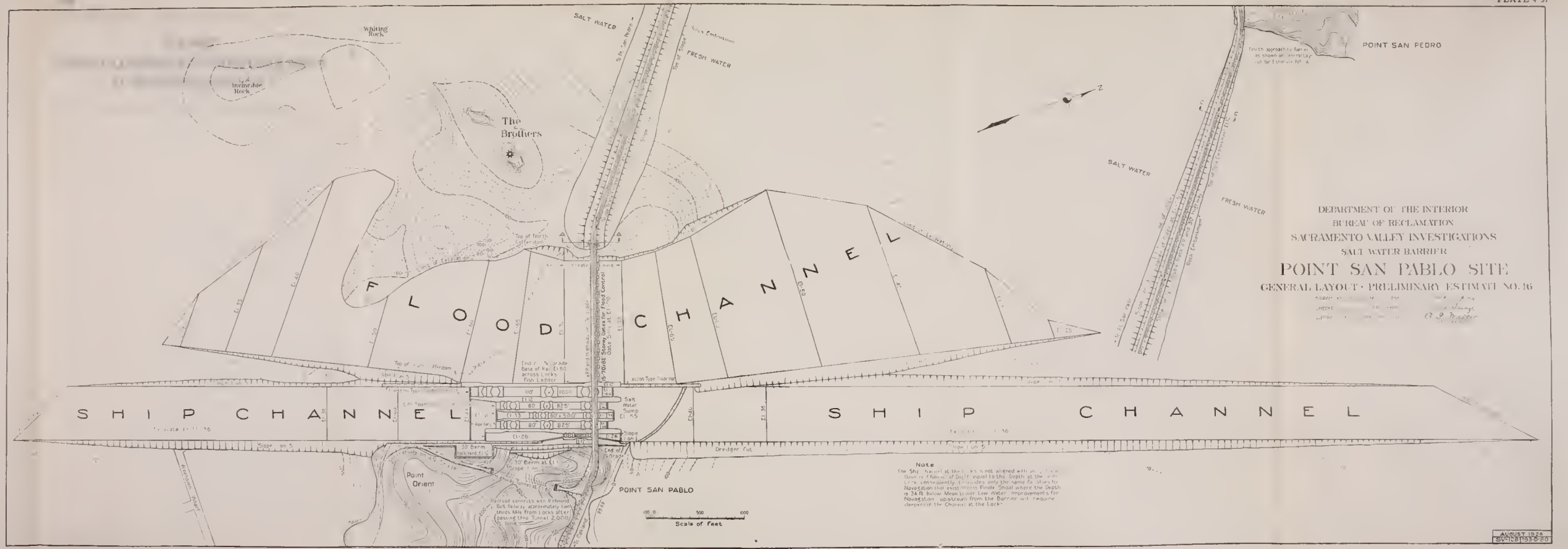
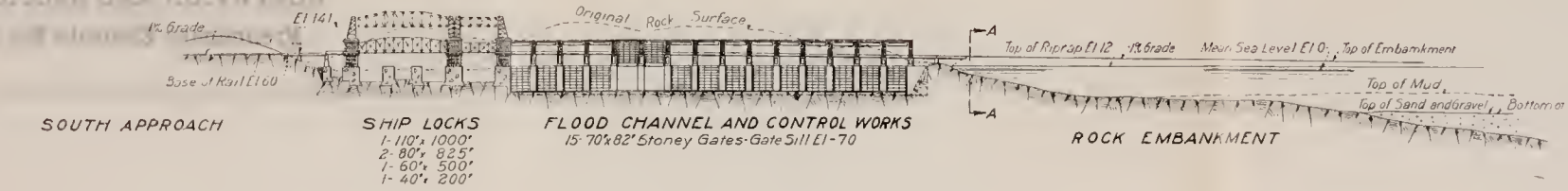

Whiting Rock
Invincible Rock
The Brothers
SALT WATER
FRESH WATER
FLOOD CHANNEL
SHIP CHANNEL
SHIP CHANNEL
Point Orient
POINT SAN PABLO
POINT SAN PEDRO
SALT WATER
FRESH WATER
Scale of Feet
Note
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS
SALT WATER BARRIER
POINT SAN PABLO SITE
GENERAL LAYOUT - PRELIMINARY ESTIMATE NO. 16
AUGUST 1956
SV-158 1956-60

Plate 4-58

ELEVATION AND SECTIONS

Preliminary Estimate No. 16

Bascule Bridge shown on Upstream Elevation for Estimate No 14 may be used as Alternative to Vertical Lift

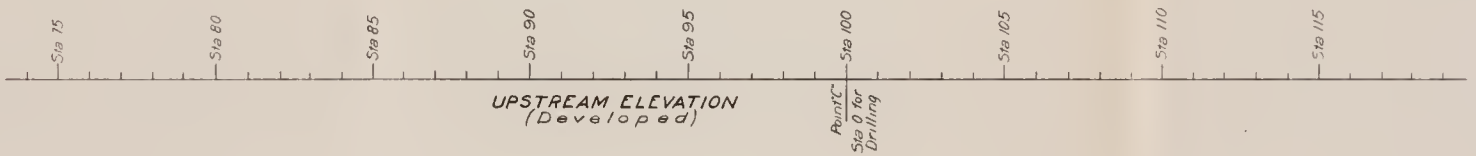


SOUTH APPROACH

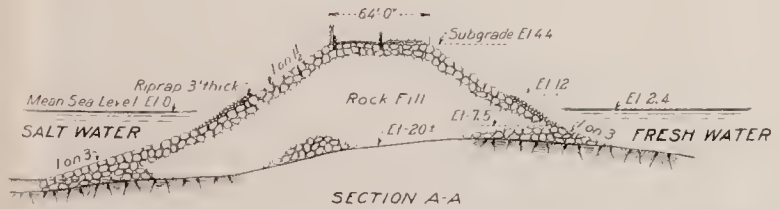
SHIP LOCKS
1- 110' x 1000'
2- 80' x 825'
1- 60' x 500'
1- 40' x 200'

FLOOD CHANNEL AND CONTROL WORKS
15- 70'x 82' Stoney Gates- Gate Sill El -70

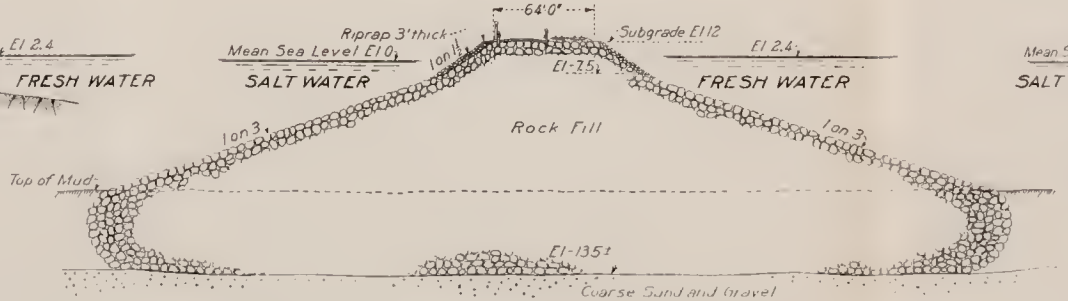
ROCK EMBANKMENT



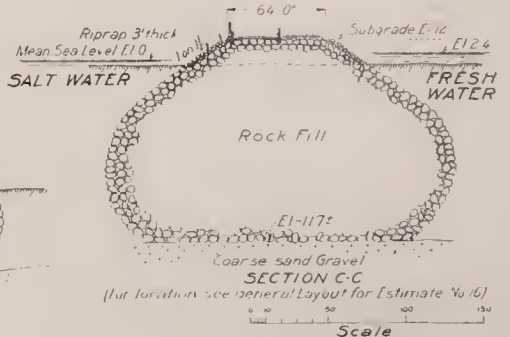
UPSTREAM ELEVATION
(Developed)



SECTION A-A



SECTION B-B
(Opposite Drill Hole 4500)



SECTION C-C
(For formation see General Layout for Estimate No 16)

Scale

EMBANKMENT SECTIONS

PRELIMINARY DESIGN

Note-
Rock Fill to be placed by Bottom Dump Barges up to Maximum Elevation permitted by Draft Remainder to be placed by Derrick Barges and Skips

APPROVED FOR ESTIMATING PURPOSES
R. P. Walter
CHIEF ENGINEER

DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS
SALT WATER BARRIER
ELEVATION AND SECTIONS
PRELIMINARY ESTIMATE NO 16

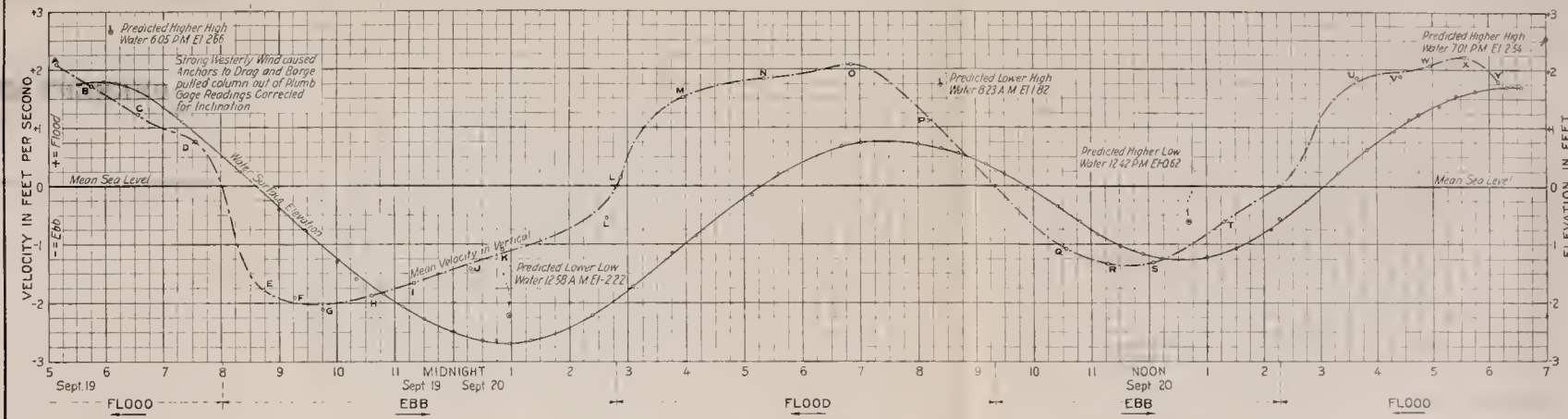
DRAWN CMJ LTF CAM SUBMITTED W.H. Young
CHECKED NBH RECOMMENDED J.L. Savage

SV-129 | Ellensburg Wash Aug 20 1926 | 193-D-81

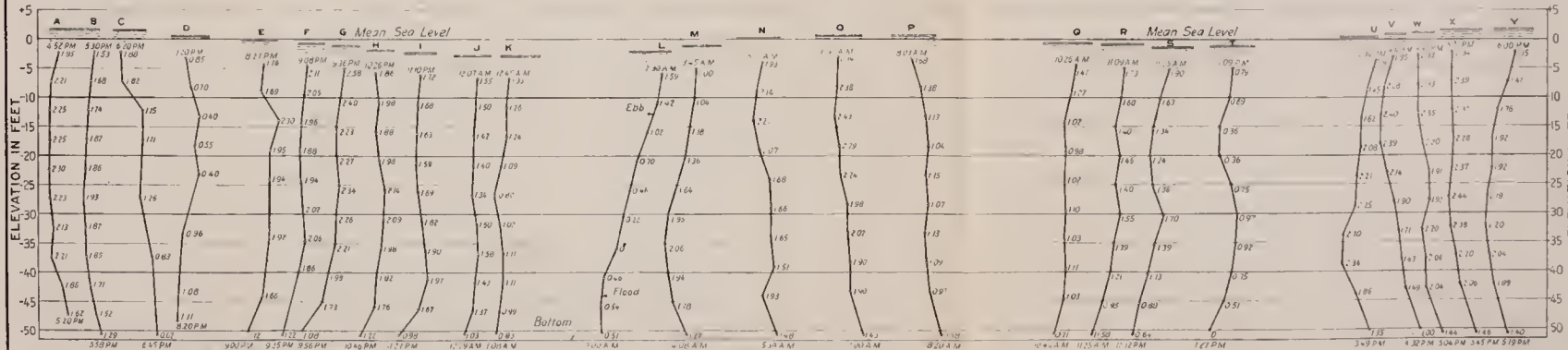
Plate 5-1

CURRENT METER MEASUREMENTS

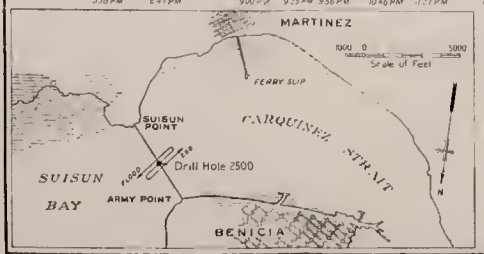
Sheet 1 of 5


Strong Wind Up stream Maximum about 8.30 PM
Wind Diminishing
Very light Up-stream Wind Diminishing about Sunrise to Calm which prevailed during the day
Wind increasing Up stream
Predicted Higher High Water 6.05 PM El 2.65
Strong Westerly Wind caused Anchors to Drag and Barge pulled column out of Plumb Gage Readings Corrected for Inclination
Predicted Lower High Water 8.23 A M El 1.82
Predicted Higher High Water 7.01 P M El 2.54
Predicted Higher Low Water 12.42 P M El 0.62
Predicted Lower Low Water 12.58 A M El -2.22
Mean Velocity in Vertical
Water Surface Elevation
Mean Sea Level
+ = Flood
- = Ebb
VELOCITY IN FEET PER SECOND
ELEVATION IN FEET
Sept. 19
MIDNIGHT
Sept 19 Sept 20
NOON
Sept 20
FLOOD
EBB
FLOOD
EBB
FLOOD

ELEVATION OF WATER SURFACE AND MEAN VELOCITY IN VERTICAL DURING TIDAL CYCLE



VELOCITY CURVES
(Numbers show velocity in ft per sec)



Observations made from Drill Barge at Hole 2500
Water Surface elevations determined from point of known elevation on drill column
The time and height of predicted tides at Benicia were determined by applying corrections to figures for Fort Point as described on pages 131, 339, 340 and 372 of Tide Tables for Pacific Coast for 1924, published by the United States Coast and Geodetic Survey
Owing to elapse of time between first and last measurements, curves do not represent simultaneous conditions throughout vertical.
The direction of flow was toward and from the Martinez ferry slip except for a few minutes during each reversal of current when the direction was perpendicular to the prevailing direction

There was no evidence to indicate variance in direction of flow at different depths except in some cases at slack tide when all velocities were low. In many cases the direction of flow was indicated by the inclination of the meter cable. When velocities were too low to carry the cable out of plumb it is believed that with gradually changing velocities at different depths and a constant direction at the surface, a change in direction below the surface cannot be inferred unless the velocities diminished to zero, or nearly zero, at some point of depth. When however the velocities diminished to zero and then increased during successive measurements and a change in direction of surface flow took place during the vertical series it was assumed that the point of zero flow marked the change in direction below the surface. See measurement L

APPROVED FOR ESTIMATING PURPOSES
A. P. Walter
CHIEF ENGINEER

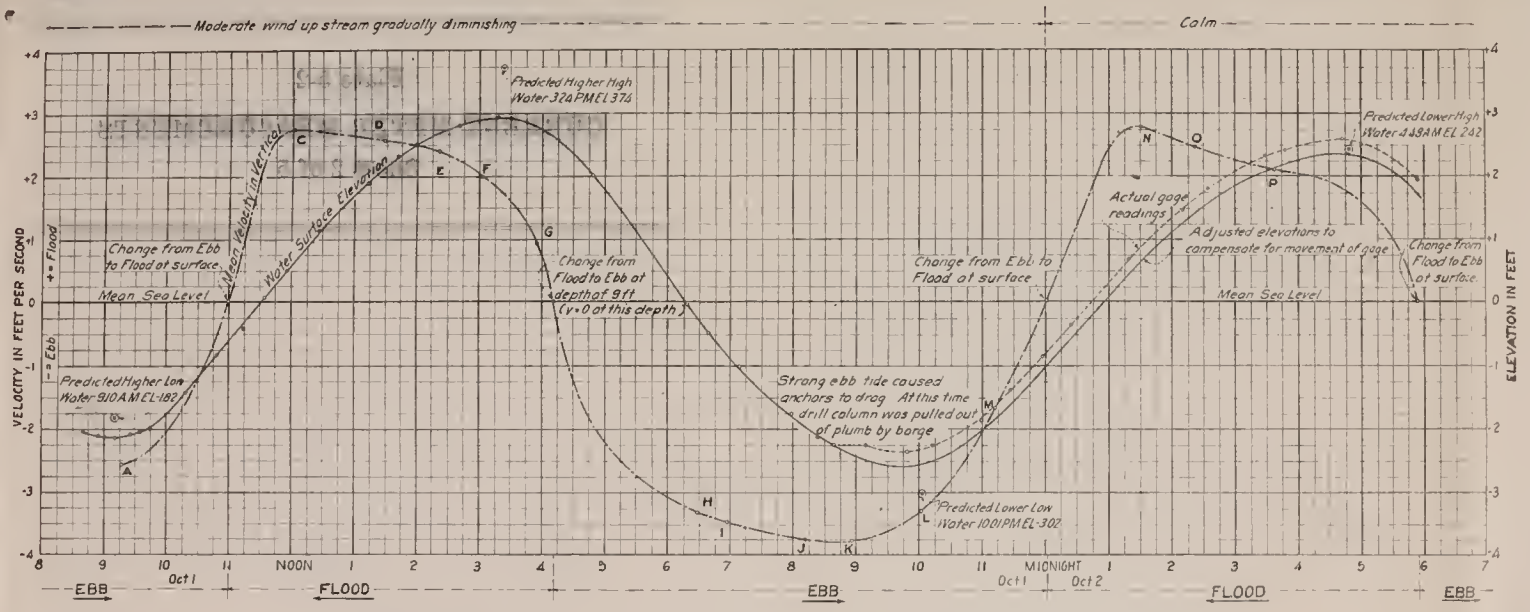
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS
SALT WATER BARRIER
ARMY POINT SITE
GAGE HEIGHTS AND VELOCITIES
TIDAL CYCLE SEPT. 19 AND 20, 1924

DRAWN N.S.H.-C.E.G. SUBMITTED J.W. Young
CHECKED H.H.R. APPROVED J.D. Savage
SV-4 Berkeley Calif. Oct 21 1924 193-D-99

Plate 5-2

CURRENT METER MEASUREMENTS

Sheet 2 of 5


Moderate wind up stream gradually diminishing
Calm
Predicted Higher High Water 324 PM EL 374
Predicted Lower High Water 448 AM EL 242
Mean Velocity in Vertical
Water Surface Elevation
Actual gage readings
Adjusted elevations to compensate for movement of gage
Change from Ebb to Flood at surface
Change from Flood to Ebb at depth of 9 ft (v=0 at this depth)
Change from Ebb to Flood at surface
Change from Flood to Ebb at surface
Mean Sea Level
Mean Sea Level
Predicted Higher Low Water 910 AM EL -182
Strong ebb tide caused anchors to drag At this time drill column was pulled out of plumb by barge
Predicted Lower Low Water 1001 PM EL -302
VELOCITY IN FEET PER SECOND
+ = Flood
- = Ebb
ELEVATION IN FEET
8 9 10 11 NOON 1 2 3 4 5 6 7 8 9 10 11 MIDNIGHT 1 2 3 4 5 6 7
Oct 1
Oct 1
Oct 2
EBB
FLOOD
EBB
FLOOD
EBB

ELEVATION OF WATER SURFACE AND MEAN VELOCITY IN VERTICAL DURING TIDAL CYCLE

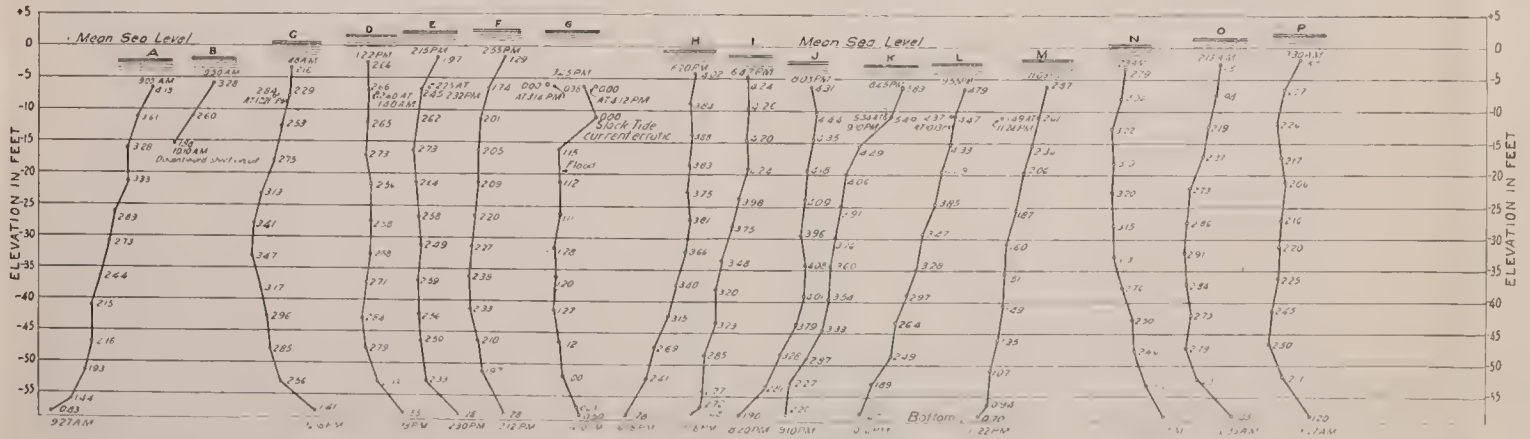
Observations made from Drill Barge at Hole 3550
Water Surface elevations determined from point of known elevation on drill column

The time and height of predicted tides at Benicia were determined by applying corrections to figures for Fort Point as described on pages 132, 339, 340 and 372 of Tide Tables for Pacific Coast for 1924, published by the United States Coast and Geodetic Survey

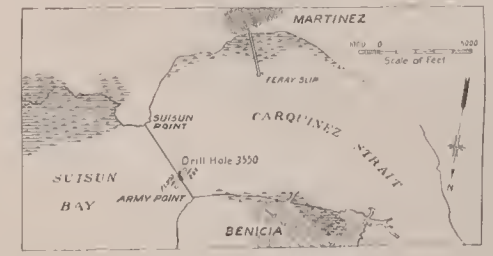
Owing to elapse of time between first and last measurements, curves do not represent simultaneous conditions throughout vertical

The direction of flow was toward and from the Martinez ferry slip except for a few minutes during each reversal of current when the direction was perpendicular to the prevailing direction

There was no evidence to indicate variance in direction of flow at different depths except in one case (measurement 6) at slack tide when all velocities were low Near the end of this measurement the surface current changed from a direction across the Channel toward Suisun Point to ebb flow although the upstream inclination of cable with meter at depths greater than 35 ft showed that the flood flow had not ceased below the surface This feature is substantiated by later measurements at other sites and these measurements also indicate that flood flow begins near the bottom before the ebb has ceased at the surface


Mean Sea Level
Mean Sea Level
A B C D E F G H I J K L M N O P
ELEVATION IN FEET
ELEVATION IN FEET
Slack Tide current ebb
Flood
Bottom

VELOCITY CURVES
(Numbers show velocity in ft per sec)



APPROVED FOR ESTIMATING PURPOSES
A P Walter
CHIEF ENGINEER

DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS
SALT WATER BARRIER
ARMY POINT SITE

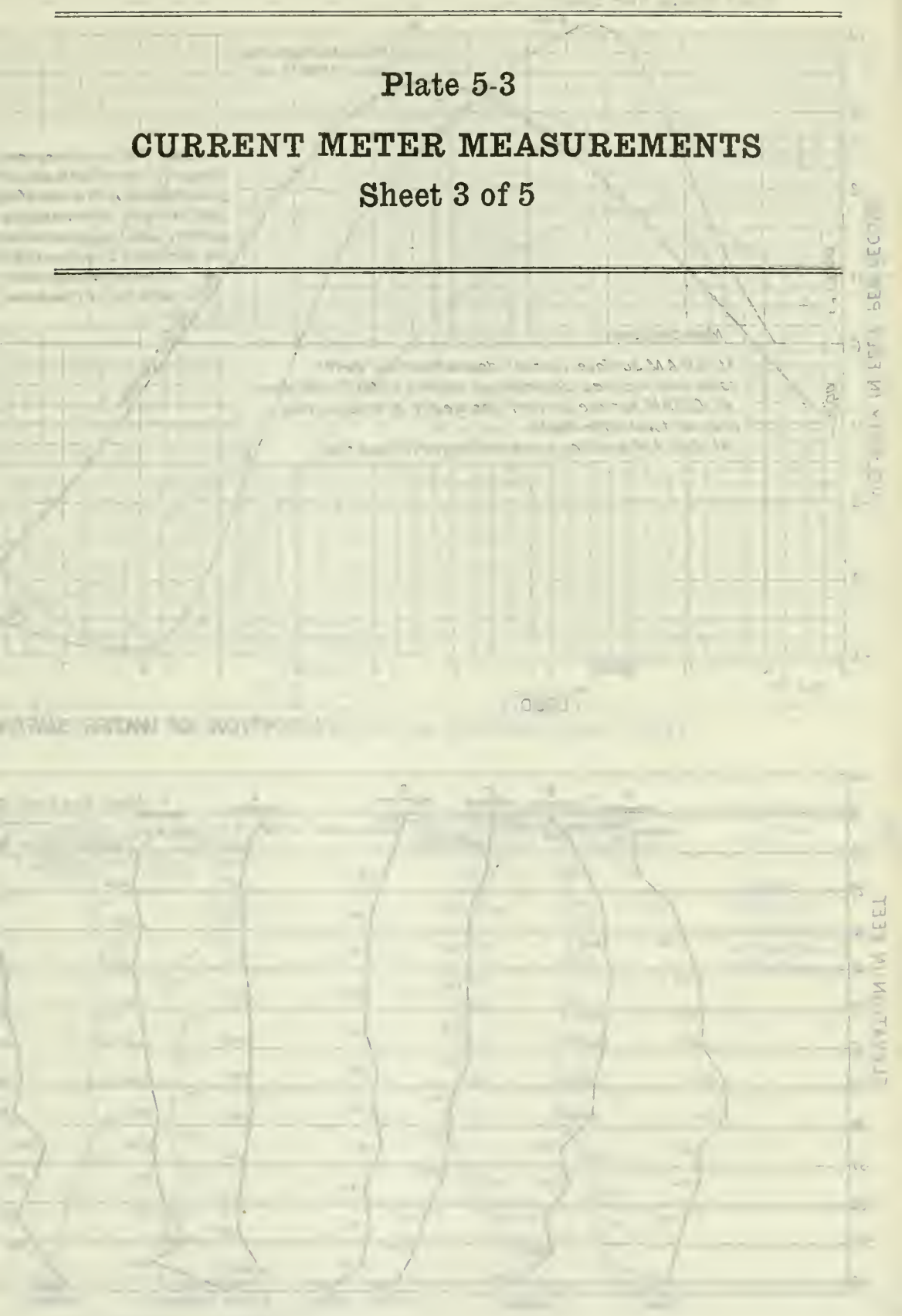
GAGE HEIGHTS AND VELOCITIES
TIDAL CYCLE OCT. 1 AND 2, 1924

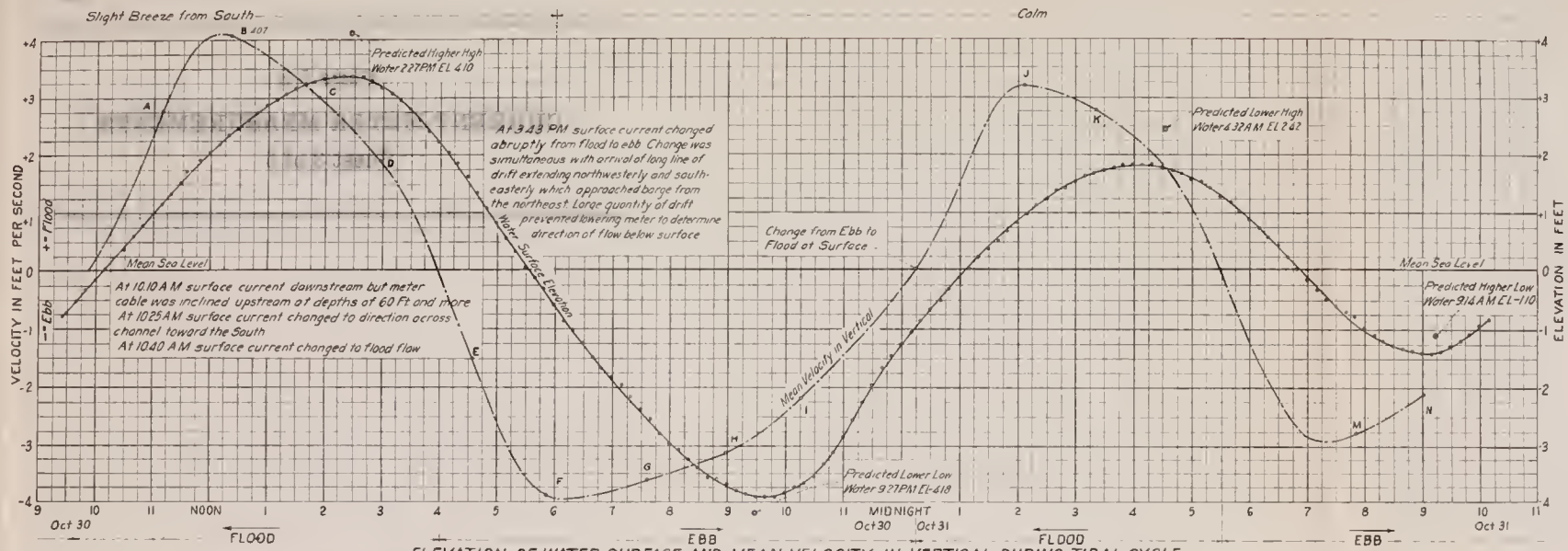
SV-5	Approved	Oct 1924	193-D-100

Plate 5-3

CURRENT METER MEASUREMENTS

Sheet 3 of 5




Slight Breeze from South
Calm
Predicted Higher High Water 2.27 PM EL 4.10
Predicted Lower High Water 4.32 AM EL 2.62
Predicted Higher Low Water 9.14 AM EL -1.10
Predicted Lower Low Water 9.27 PM EL -4.18
At 3.43 PM surface current changed abruptly from flood to ebb. Change was simultaneous with arrival of long line of drift extending northwesterly and southeasterly which approached barge from the northeast. Large quantity of drift prevented lowering meter to determine direction of flow below surface
At 10.10 A.M. surface current downstream but meter cable was inclined upstream at depths of 60 Ft and more
At 10.25 A.M. surface current changed to direction across channel toward the South
At 10.40 A.M. surface current changed to flood flow
Change from Ebb to Flood at Surface
Water Surface Elevation
Mean Velocity in Vertical
Mean Sea Level
VELOCITY IN FEET PER SECOND
+ Flood
- Ebb
ELEVATION IN FEET
Oct 30
Oct 31
MIDNIGHT
NOON
FLOOD
EBB

ELEVATION OF WATER SURFACE AND MEAN VELOCITY IN VERTICAL DURING TIDAL CYCLE

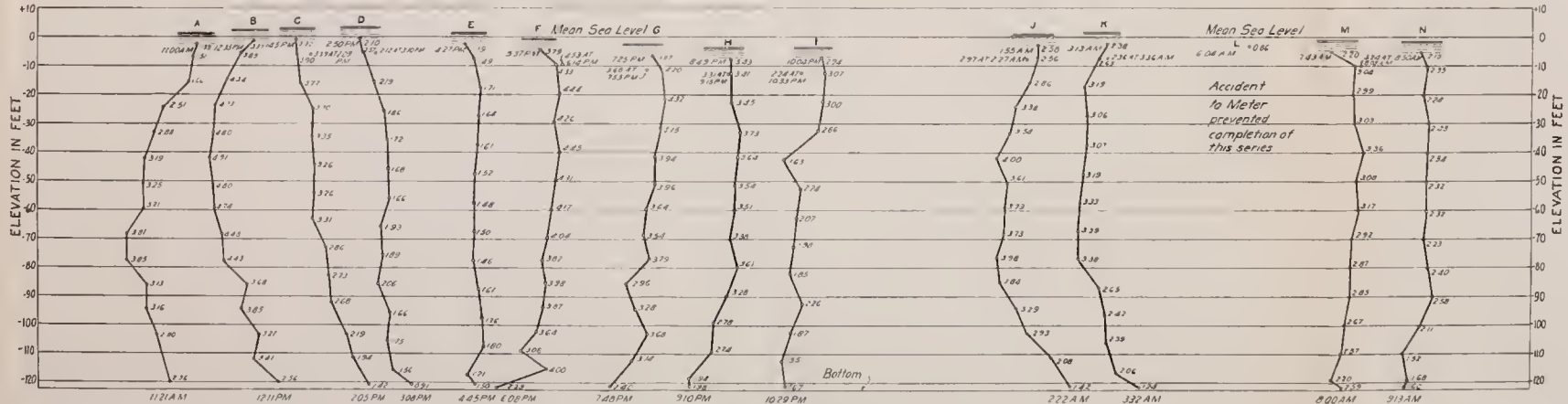
Observations made from Drill Barge at Hole 1900
Water surface elevations determined from gage on pier east of Eckley.

The time and height of predicted tides at Dillon Point were determined by applying corrections to figures for Fort Point as described on pages 132, 339, 340 and 372 of Tide Tables for Pacific Coast for 1924, published by the United States Coast and Geodetic Survey.

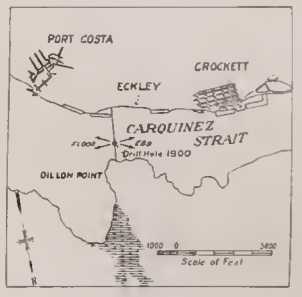
Owing to elapse of time between first and last measurements, curves do not represent simultaneous conditions throughout vertical.

The direction of flow fluctuated through an angle of 30 deg during each ebb and flood tide and was never constant for periods of any length.

The indications that flood flow begins near the bottom before the ebb has ceased at the surface are substantiated by later measurements at another site. Measurements at other sites prior and subsequent to those at Dillon Point indicate that flood flow is sustained near the bottom after ebb has begun at the surface.



VELOCITY CURVES
(Numbers show velocity in ft per sec.)



APPROVED FOR ESTIMATING PURPOSES
R. P. Walter
CHIEF ENGINEER

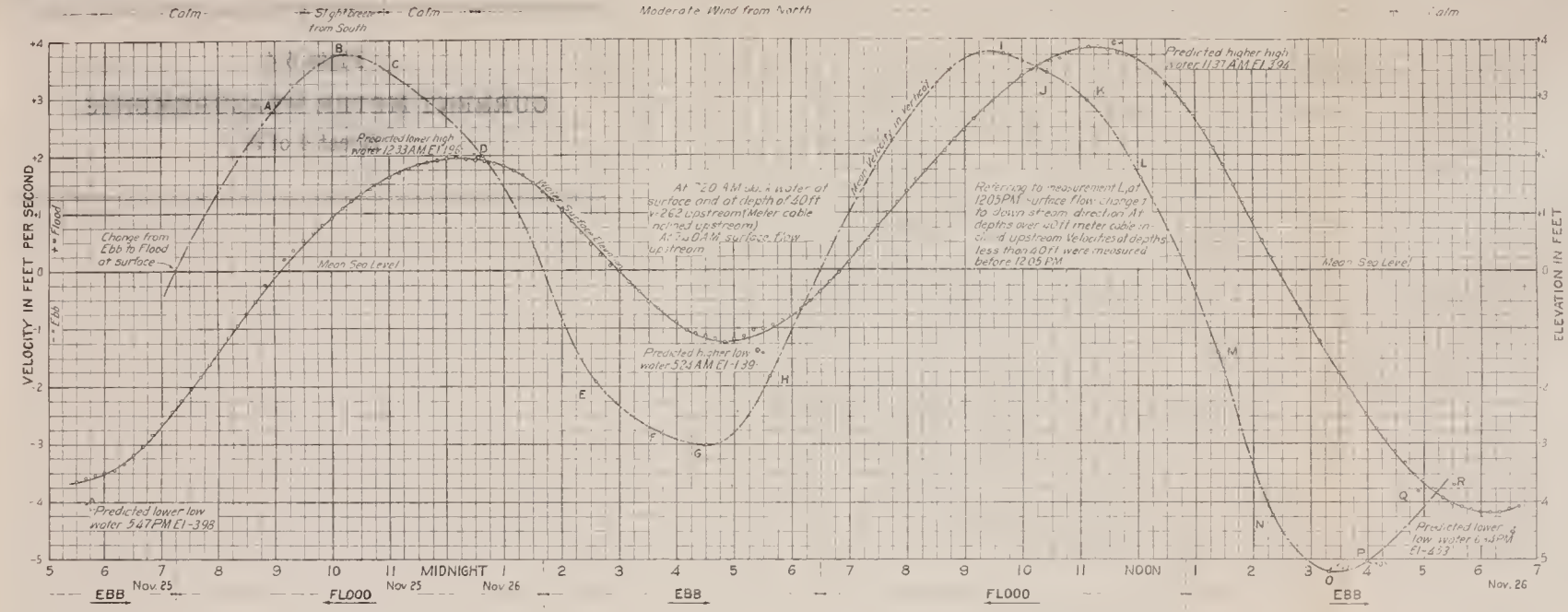
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS
SALT WATER BARRIER
DILLON POINT SITE
SAGE HEIGHTS AND VELOCITIES
TIDAL CYCLE OCT. 30 AND 31, 1924

DRAWN N.S.H.-N.D.H. SUBMITTED W.E. Quigley
CHECKED A.C.R. APPROVED J.R. Savage
SV-6 Berkeley, Calif. Dec. 12 1924 193-D-101

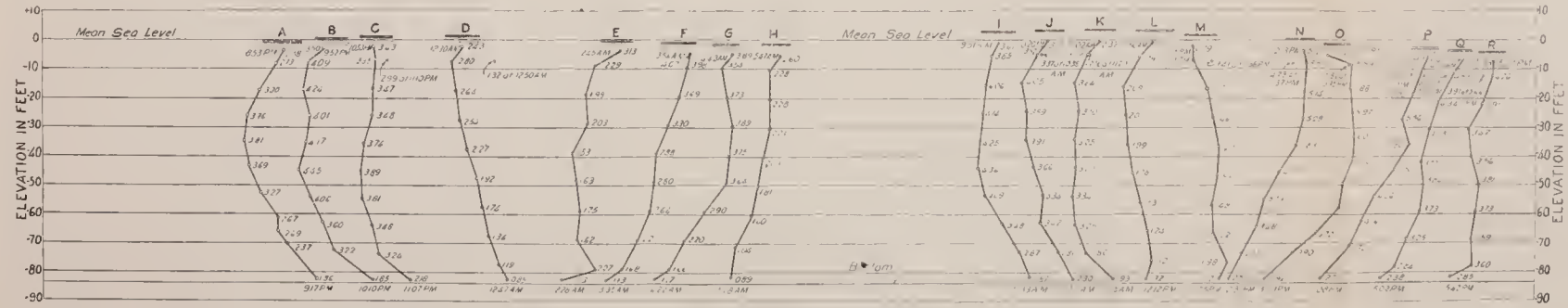
Plate 5-4

CURRENT METER MEASUREMENTS

Sheet 4 of 5


Calm
Slight Breeze from South
Calm
Moderate Wind from North
Calm
VELOCITY IN FEET PER SECOND
ELEVATION IN FEET
+ = Flood
- = Ebb
Change from Ebb to Flood at surface
Mean Sea Level
Predicted lower high water 1233 AM El 1.06
Predicted higher high water 1137 AM El 3.96
Predicted higher low water 524 AM El 1.39
Predicted lower low water 547 PM El -3.98
Predicted lower low water 6.45 PM El -4.53
At 720 AM observed water surface and at depth of 40 ft +.262 upstream (Meter cable inclined upstream) At 740 AM surface flow upstream
Maximum velocity in vertical
Referring to measurement L, at 1205 PM surface flow changed to down stream direction At depths over 40 ft meter cable inclined upstream Velocities at depths less than 40 ft were measured before 1205 PM
Mean Sea Level
MIDNIGHT
NOON
5 6 7 8 9 10 11 1 2 3 4 5 6 7 8 9 10 11 1 2 3 4 5 6 7
EBB
Nov. 25
FLOOD
Nov. 25
Nov. 26
EBB
FLOOD
EBB
Nov. 26

ELEVATION OF WATER SURFACE AND MEAN VELOCITY IN VERTICAL DURING TIDAL CYCLE



VELOCITY CURVES
(Numbers show velocity in ft per sec.)

Observations made from Drill Barge at Hole 4500
Water surface elevations determined from gage on Pier at Point San Pablo.

The time and height of predicted Tides at McNear Landing were determined by applying corrections to figures for Fort Point as described on pages 132, 339, 340 and 372 of Tide Tables for Pacific Coast for 1924, published by the United States Coast and Geodetic Survey.

Owing to elapse of time between first and last measurements, curves do not represent simultaneous conditions throughout vertical.

The direct ebb flow was generally perpendicular to the line of drilling. During the early part of the flood flow however the surface current approached the Barge from a point between San Quentin and the Main Islands while the direction of current below the surface was perpendicular to the line of drilling as at other times.

Observations indicate that flood flow begins near the bottom before the ebb has ceased at the surface and is sustained near the bottom after ebb has begun at the surface.

APPROVED FOR ESTIMATING PURPOSES
R. F. Walter
CHIEF ENGINEER

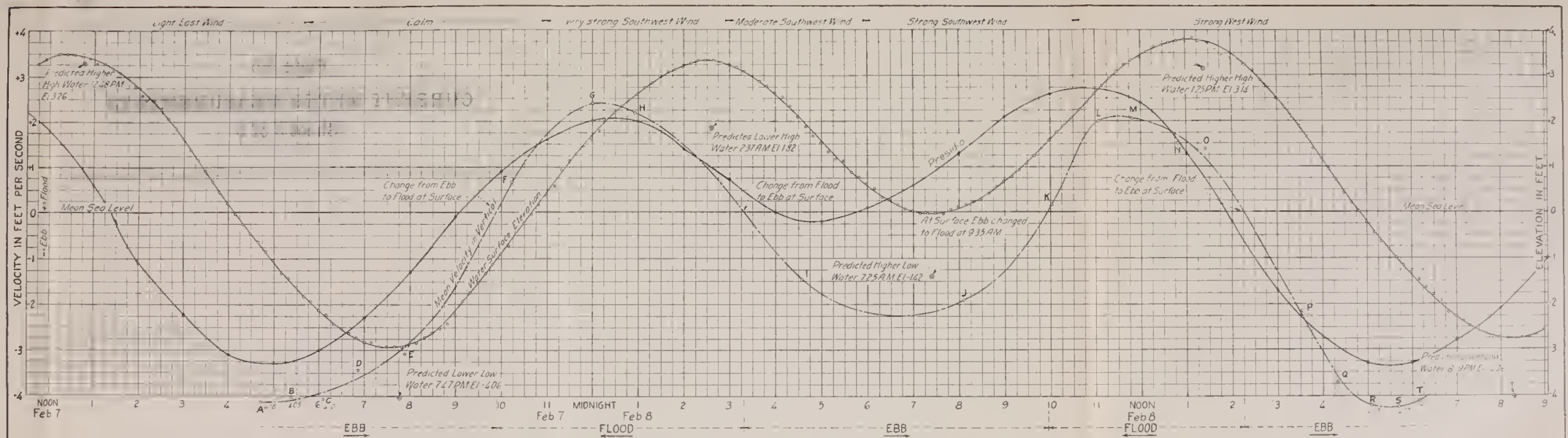
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS
SALT WATER BARRIER
POINT SAN PABLO SITE
GAGE HEIGHTS AND VELOCITIES
TIDAL CYCLE NOV 25 AND 26, 1924

DESIGN SUPERVISED BY		SUBMITTED	
DRAWN BY H.S.A.		APPROVED	
SV-7	Berkeley, Cal. Dec 22 1932	193-D-102	

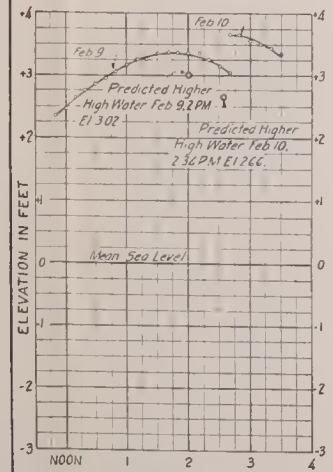
Plate 5-5

CURRENT METER MEASUREMENTS

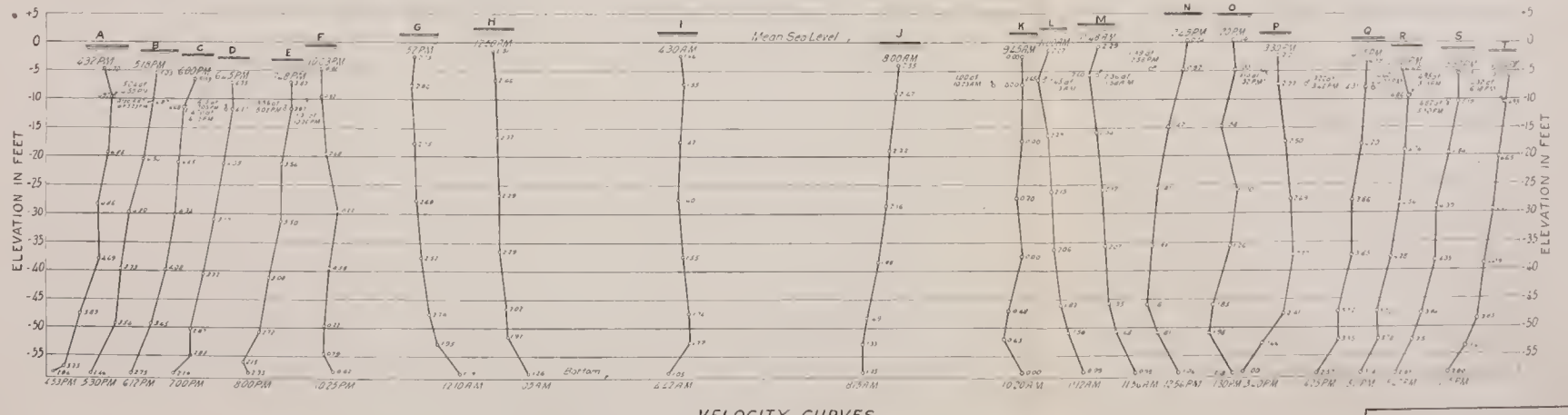
Sheet 5 of 5



ELEVATION OF WATER SURFACE AND MEAN VELOCITY IN VERTICAL DURING TIDAL CYCLE


Feb 10
Feb 9
Predicted Higher High Water Feb 9 2PM El 3.02
Predicted Higher High Water Feb 10 2:36PM El 2.66
Mean Sea Level
ELEVATION IN FEET
NOON

ELEVATION OF WATER SURFACE



VELOCITY CURVES
(Numbers show velocity in ft per sec)

Observations made from Drill Barge at Hole 3350 For locality Map see Dwg SV 5 prepared in connection with observations made Oct 1 and 2, 1926 at the same place
Water surface elevations determined from gage on Pier at Suisun Point
The time and height of predicted Tides at Benicia were determined by applying corrections to figures for Fort Point as described on pages 129, 339, 340 and 372 of Tide Tables for Pacific Coast for 1925, published by the United States Coast and Geodetic Survey

Owing to elapse of time between first and last measurements, these curves represent simultaneous conditions throughout vertical
The direction of flow was towards and from Martinez for slip except for a short period during each reversal of current, when the direction was perpendicular to the prevailing direction
During reversal of surface current there was at no time any indication of eddy to indicate direction of flow below surface

APPROVED FOR ESTIMATING PURPOSES
R. P. Walter
CHIEF ENGINEER

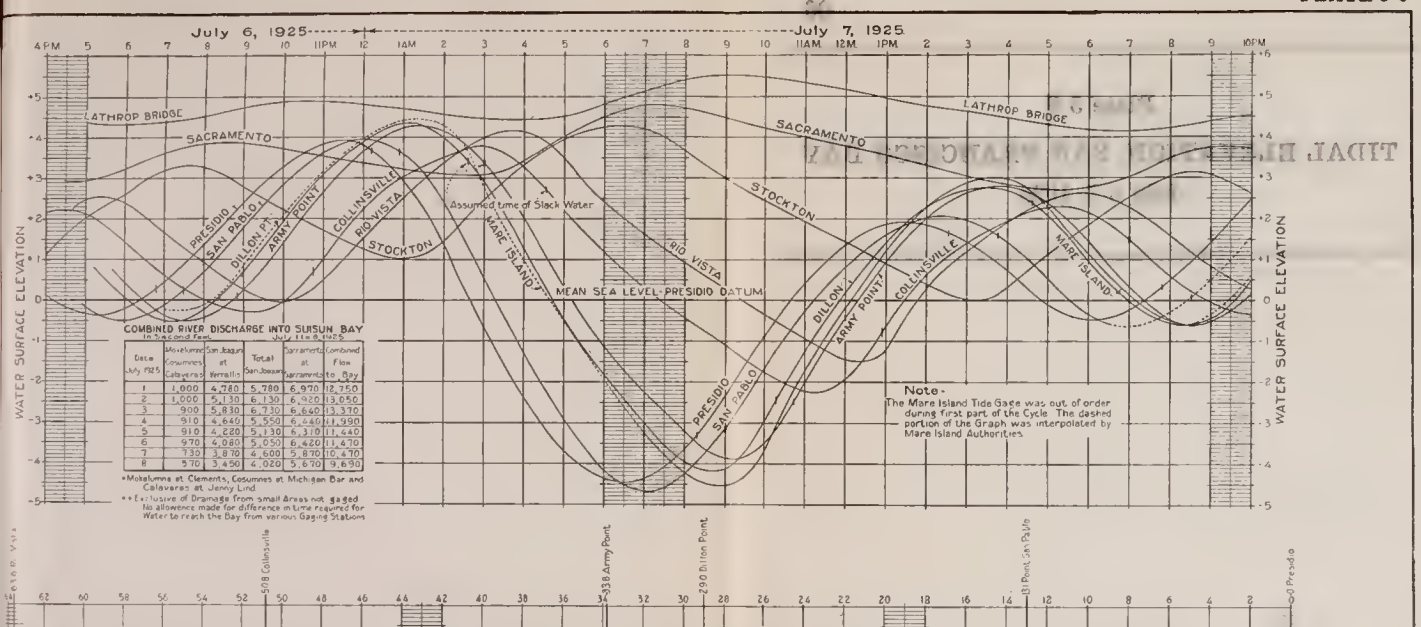
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS
SALT WATER BARRIER
ARMY POINT SITE
GAGE HEIGHTS AND VELOCITIES
TIDAL CYCLE FEB 7 AND 8, 1925

DRAWN N.B.M.M.	SUBMITTED		
CHECKED H.A.K.	APPROVED		
SV-27	Blueprint by Calif. Mar 7, 1928		193-D-103

Plate 5-6

TIDAL ELEVATION, SAN FRANCISCO BAY

July 6-7, 1925

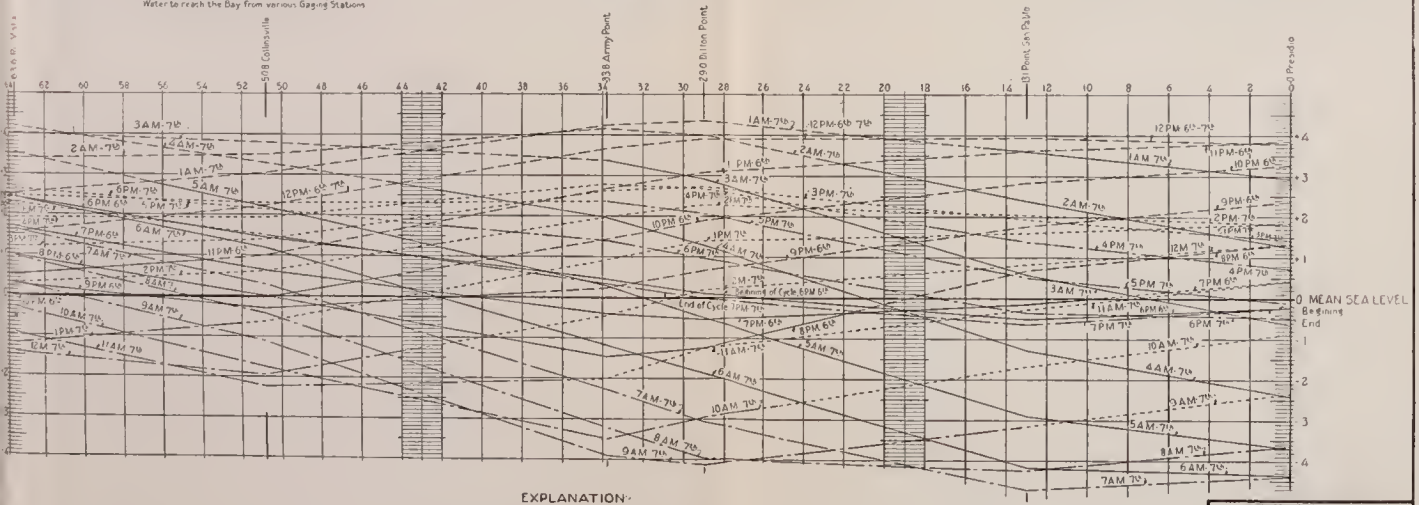

July 6, 1925
July 7, 1925
4PM 5 6 7 8 9 10 11PM 12 1AM 2 3 4 5 6 7 8 9 10 11AM 12M. 1PM 2 3 4 5 6 7 8 9 10PM
WATER SURFACE ELEVATION
+6 +5 +4 +3 +2 +1 0 -1 -2 -3 -4 -5
LATHROP BRIDGE
SACRAMENTO
PRESIDIO
SAN PABLO
DILLON PT.
ARMY POINT
COLLINSVILLE
ROVISTA
STOCKTON
MARE ISLAND
Assumed time of Slack Water
MEAN SEA LEVEL-PRESIDIO DATUM
RIO VISTA
DILLON
Note-
The Mare Island Tide Gage was out of order during first part of the Cycle. The dashed portion of the Graph was interpolated by Mare Island Authorities.

COMBINED RIVER DISCHARGE INTO SUISUN BAY
In Second Feet. July 11 to 8, 1925

Date July 1925	Mokelumne & Cosumnes & Calaveras*	San Joaquin at Vernalis	Total San Joaquin	Sacramento at Sacramento	Combined Flow to Bay
1	1,000	4,780	5,780	6,970	12,750
2	1,000	5,130	6,130	6,920	13,050
3	900	5,830	6,730	6,640	13,370
4	910	4,640	5,550	6,640	11,990
5	910	4,220	5,130	6,310	11,440
6	970	4,080	5,050	6,420	11,470
7	730	3,870	4,600	5,870	10,470
8	970	3,450	4,020	5,670	9,690

*Mokelumne at Clements, Cosumnes at Michigan Bar and Calaveras at Jenny Lind

**Exclusive of Drainage from small Areas not gaged. No allowance made for difference in time required for Water to reach the Bay from various Gaging Stations


598 Collinsville
538 Army Point
290 Dillon Point
0 Point San Pablo
0 Presidio
62 60 58 56 54 52 50 48 46 44 42 40 38 36 34 32 30 28 26 24 22 20 18 16 14 12 10 8 6 4 2
+4 +3 +2 +1 0 -1 -2 -3 -4
0 MEAN SEA LEVEL
Beginning
End
End of Cycle 7PM 7th
Beginning of Cycle 6PM 6th

EXPLANATION:
- Ebb, 6 PM July 6th to 6 AM July 7th
- Flood
- Ebb, 7 AM July 7th to 7 PM July 7th
- Flood

APPROVED FOR ESTIMATING PURPOSES
R. P. Walker
CHIEF ENGINEER

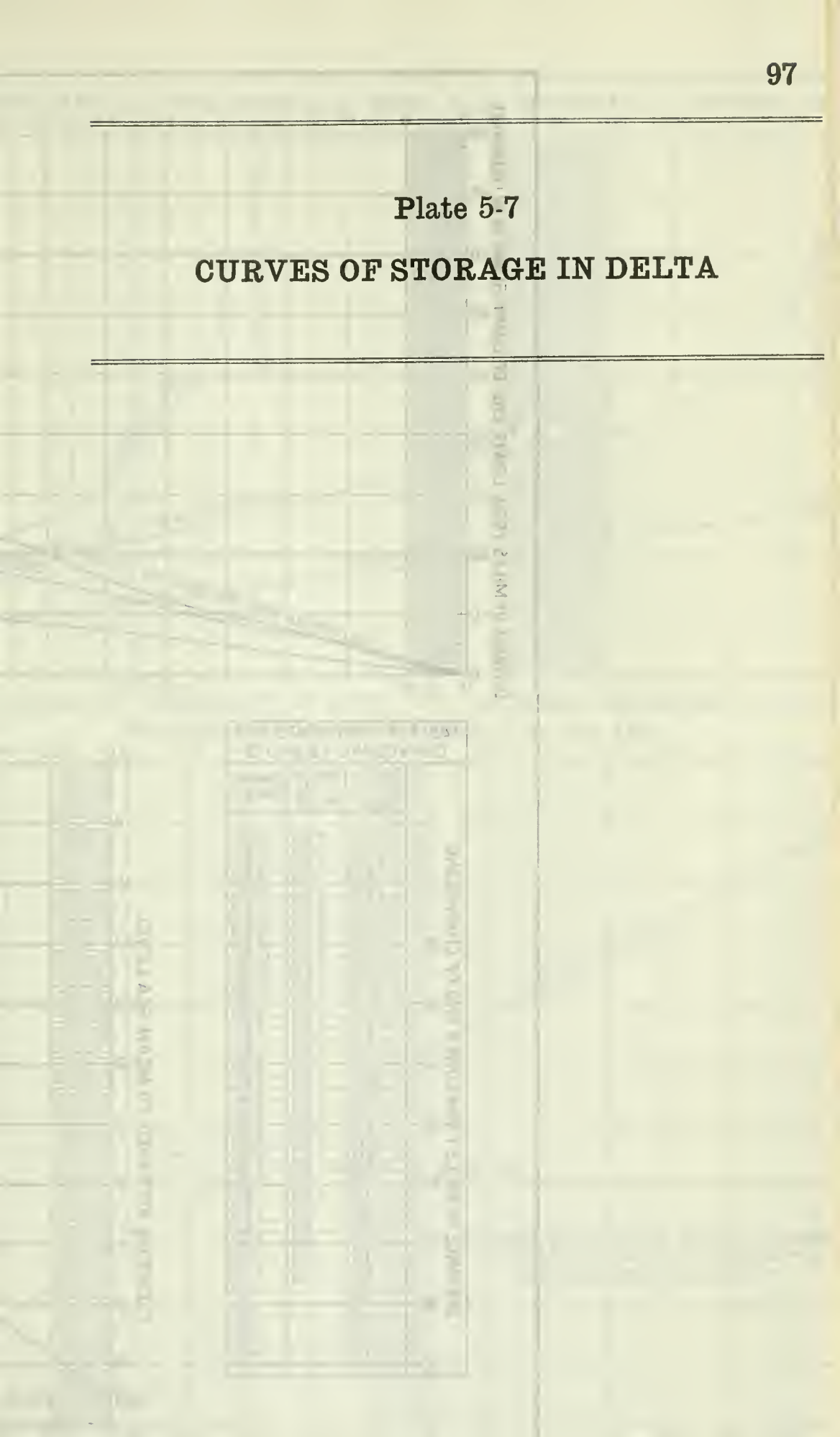
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS
SALT WATER BARRIER
TIDAL ELEVATIONS
SAN FRANCISCO BAY
JULY 6 AND 7 1925

Drawn MAP CAM	Submitted
Traced	Approved

SV-65 Berkeley, California, May 1926 1930-86

Plate 5-7

CURVES OF STORAGE IN DELTA



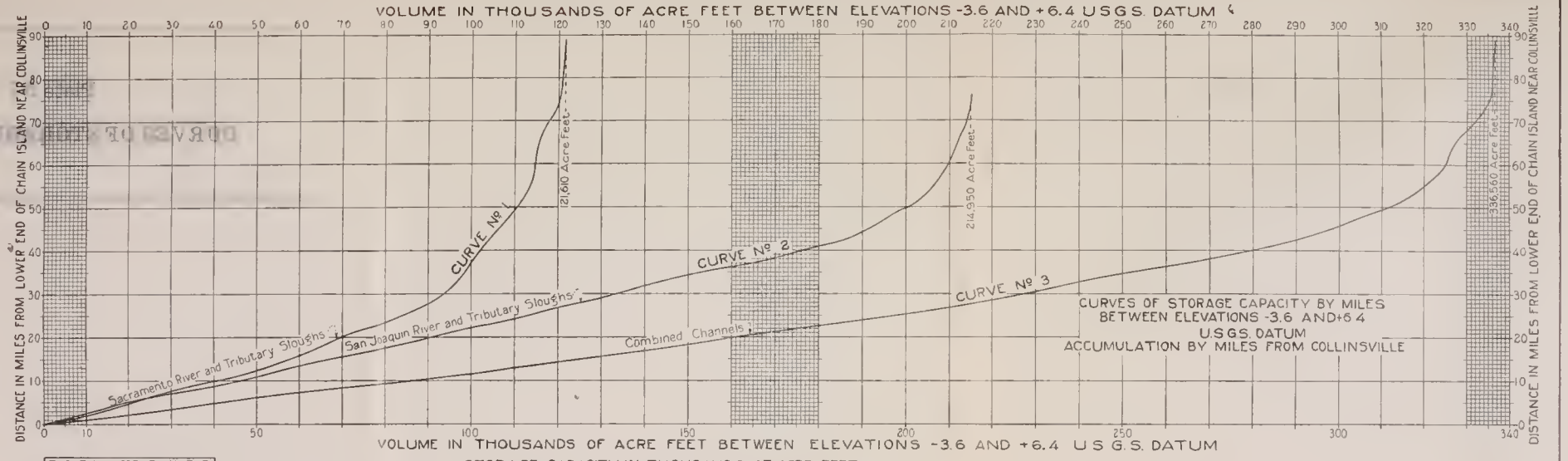
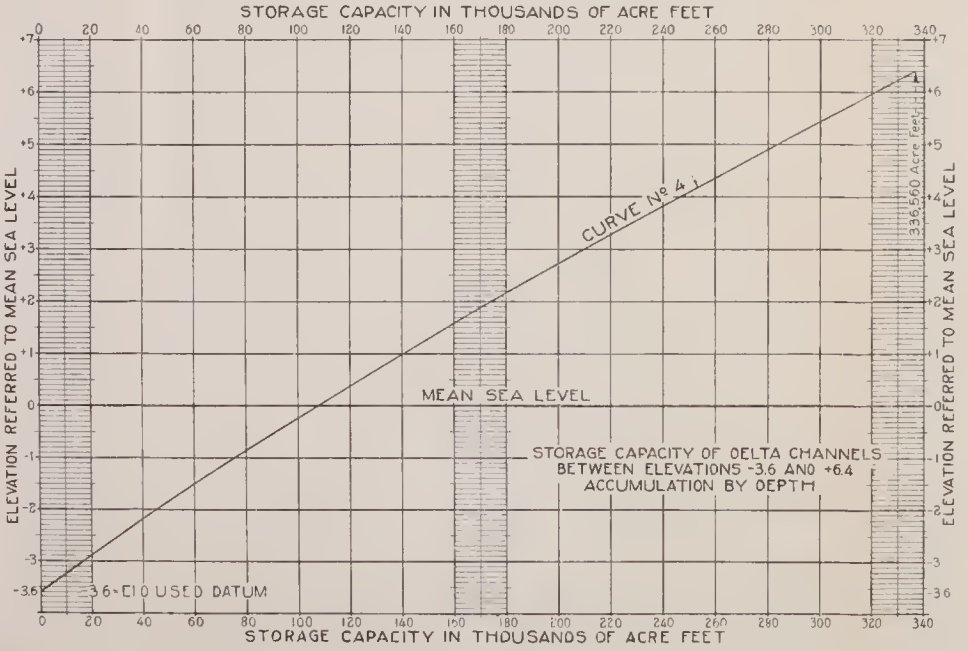
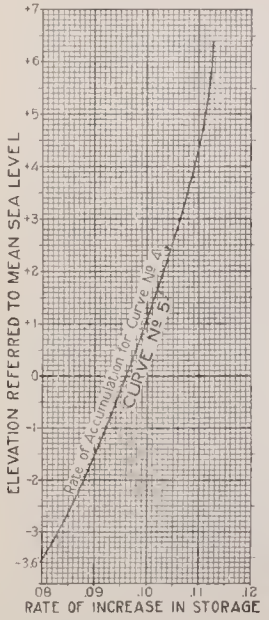

VOLUME IN THOUSANDS OF ACRE FEET BETWEEN ELEVATIONS -3.6 AND +6.4 U.S.G.S. DATUM
DISTANCE IN MILES FROM LOWER END OF CHAIN ISLAND NEAR COLLINSVILLE
CURVE Nº 1
21,610 Acre Feet
CURVE Nº 2
214,950 Acre Feet
CURVE Nº 3
336,560 Acre Feet
Sacramento River and Tributary Sloughs
San Joaquin River and Tributary Sloughs
Combined Channels
CURVES OF STORAGE CAPACITY BY MILES
BETWEEN ELEVATIONS -3.6 AND+6.4
U.S.G.S. DATUM
ACCUMULATION BY MILES FROM COLLINSVILLE
VOLUME IN THOUSANDS OF ACRE FEET BETWEEN ELEVATIONS -3.6 AND +6.4 U.S.G.S. DATUM

TABLE OF INCREMENTS FOR CURVES NOS 1,2 AND 3

DISTANCE IN MILES FROM LOWER END OF CHAIN ISLAND	SACRAMENTO RIVER	SAN JOAQUIN RIVER	COMBINED CHANNELS
0			
2	10,200	8,000	18,200
4	7,500	7,800	15,300
6	6,300	8,200	14,500
8	7,000	11,500	18,500
10	9,500	10,500	20,000
2	8,600	9,100	16,700
4	5,800	8,470	14,270
6	5,300	9,770	15,070
8	5,000	10,250	15,250
20	4,630	8,260	12,890
2	5,720	8,580	14,300
4	6,060	9,690	15,750
6	5,080	7,700	12,780
8	3,780	9,180	12,960
30	3,120	7,560	10,680
2	2,340	6,940	9,280
4	1,470	8,040	9,510
6	1,510	10,010	11,520
8	1,710	10,540	12,250
40	1,670	7,530	9,200
2	1,660	7,480	9,140
4	1,570	5,230	6,800
6	1,760	4,100	5,860
8	1,760	2,890	4,650
50	1,640	4,360	6,000
2	1,200	2,500	3,700
4	1,250	2,370	3,620
6	850	1,540	2,390
8	600	1,580	2,180
60	300	1,030	1,330
2	100	830	930
4	300	790	1,090
6	550	860	1,410
8	950	950	1,900
70	1,100	860	1,960
2	1,300	470	1,770
4	800	390	1,190
6	600	100	700
8	250		250
80	100		100
2	100		100
4	150		150
6	250		250
8	150		150
90	30		30


STORAGE CAPACITY IN THOUSANDS OF ACRE FEET
ELEVATION REFERRED TO MEAN SEA LEVEL
CURVE Nº 4
336,560 Acre Feet
MEAN SEA LEVEL
STORAGE CAPACITY OF DELTA CHANNELS
BETWEEN ELEVATIONS -3.6 AND +6.4
ACCUMULATION BY DEPTH
-3.6 = EIO USED DATUM
STORAGE CAPACITY IN THOUSANDS OF ACRE FEET



Notes.-

The Abcissas on Curve Nº 5 represent the fractional part of the total accumulation which would be included in a Section one foot deep at the various Elevations indicated by the Ordinates

It was assumed in the use of Curves Nos 4 and 5 that Curve Nº 4 represents the form of the Storage Curve for each two Mile Block as well as for the total Volume of Storage

The Curves do not include 16,810 Acre Feet of Marsh Storage lying above El 2.9 Upstream from Cache Slough.

APPROVED FOR ESTIMATING PURPOSES.-
R. P. Walter
CHIEF ENGINEER

DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS
SALT WATER BARRIER
CURVES OF STORAGE IN DELTA FOR TIDAL STUDIES

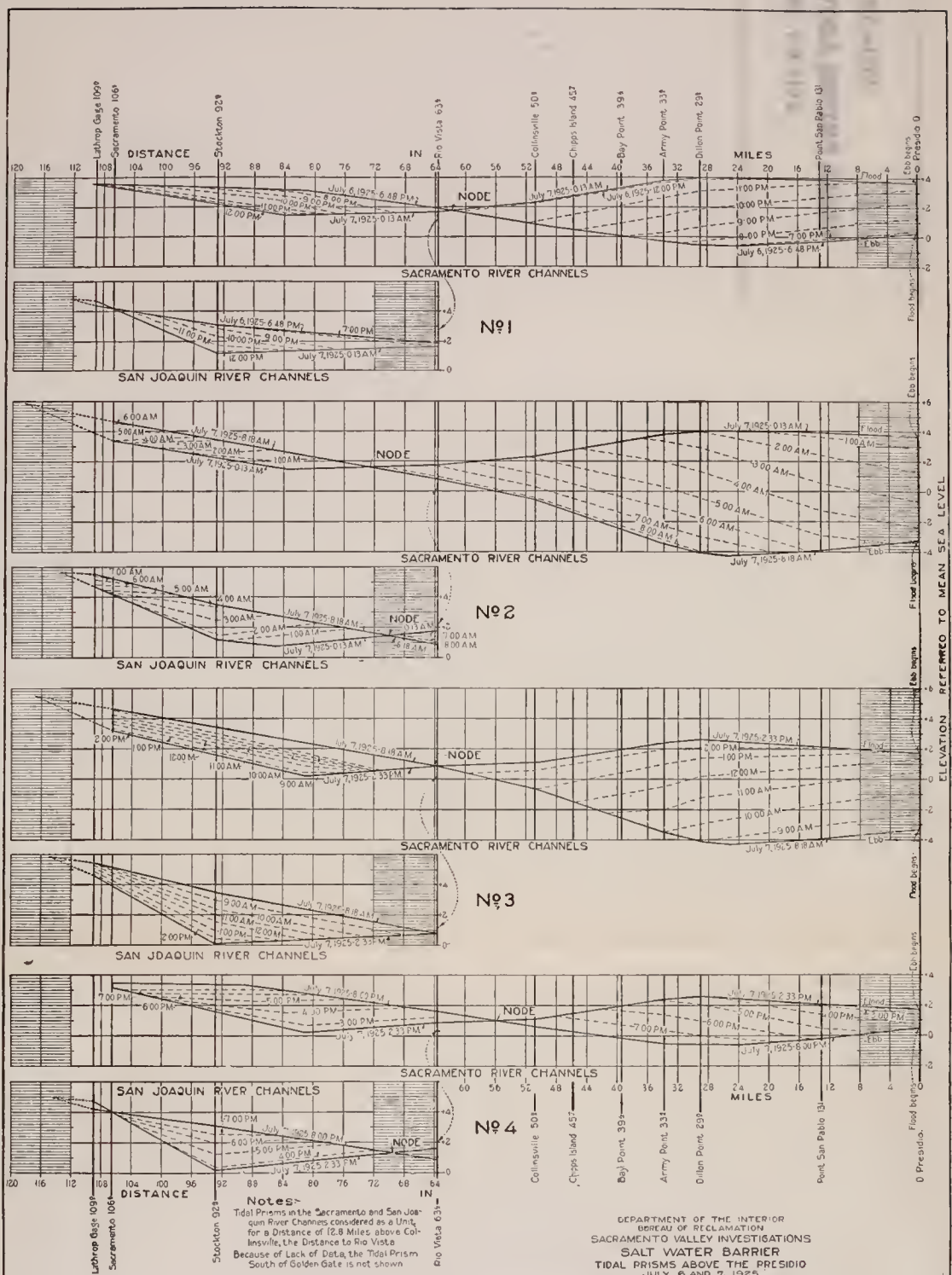
Drawn: W.P.C.A.M. Submitted: L. Tolmie
Checked: Approved: Jas Savage

SV-130 | Berkeley California Mch 1926 | 193-D-83

Plate 5-8

TIDAL PRISMS ABOVE PRESIDIO

July 6-7, 1925



Notes:
Tidal Prisms in the Sacramento and San Joaquin River Channels considered as a Unit, for a Distance of 12.8 Miles above Collinsville, the Distance to Rio Vista
Because of Lack of Data, the Tidal Prism South of Golden Gate is not shown

APPROVED FOR ESTIMATING PURPOSES
A. P. Stalter
CHIEF ENGINEER

DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS
SALT WATER BARRIER
TIDAL PRISMS ABOVE THE PRESIDIO
JULY 6 AND 7, 1925

Drawn - WAP. CAM. Submitted - O. H. Ostrom
Checked - Approved - J. L. Savage
SV-131 Berkeley California March 1926 193-D-84

PLATE 5-8

Plate 5-9

TIDAL PRISMS ABOVE POINT SAN PABLO

July 6-7, 1925

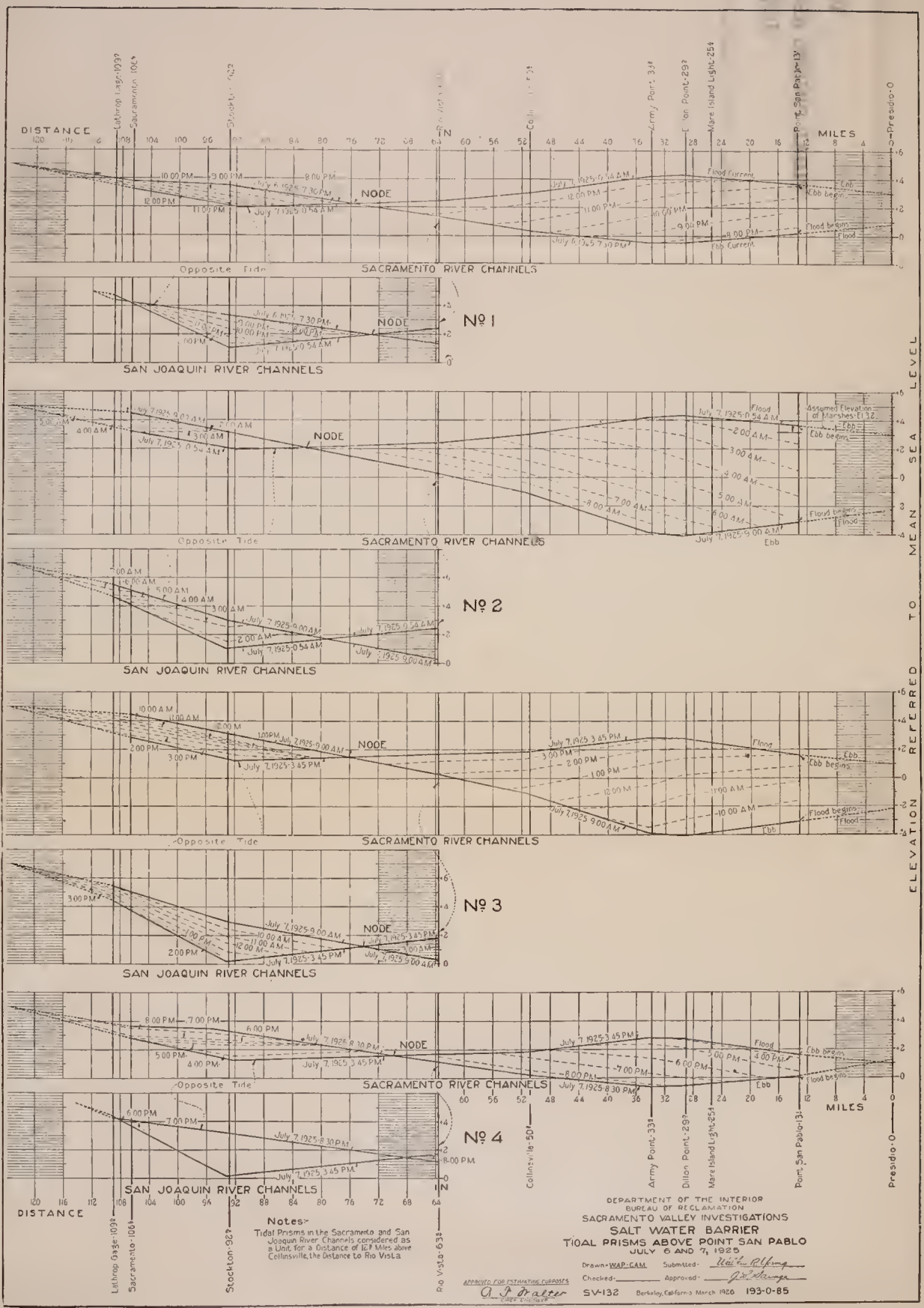

DISTANCE
MILES
Lathrop 139+1939
Sacramento 106+
Stockton 92+
Rio Vista 63+
Collinsville 50+
Army Point 33+
Dillon Point 29+
Mare Island Light 25+
Point San Pablo 13+
Presidio 0
SACRAMENTO RIVER CHANNELS
SAN JOAQUIN RIVER CHANNELS
Opposite Tide
NODE
Flood Current
Ebb Current
Ebb begins
Flood begins
Flood
Ebb
Assumed Elevation of Marshes El 3.2
ELEVATION REFERRED TO MEAN SEA LEVEL
Nº 1
Nº 2
Nº 3
Nº 4
Notes:
Tidal Prisms in the Sacramento and San Joaquin River Channels considered as a Unit, for a Distance of 16.8 Miles above Collinsville, the Distance to Rio Vista
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS
SALT WATER BARRIER
TIDAL PRISMS ABOVE POINT SAN PABLO
JULY 6 AND 7, 1925
Drawn-WAP-CAM. Submitted-
Checked- Approved-
APPROVED FOR ESTIMATING PURPOSES
A. P. Krutter
CHIEF ENGINEER
SV-132 Berkeley, California March 1926 193-0-85

PLATE 5-9

Plate 5-10

TIDAL PRISMS ABOVE ARMY POINT

July 6-7, 1925

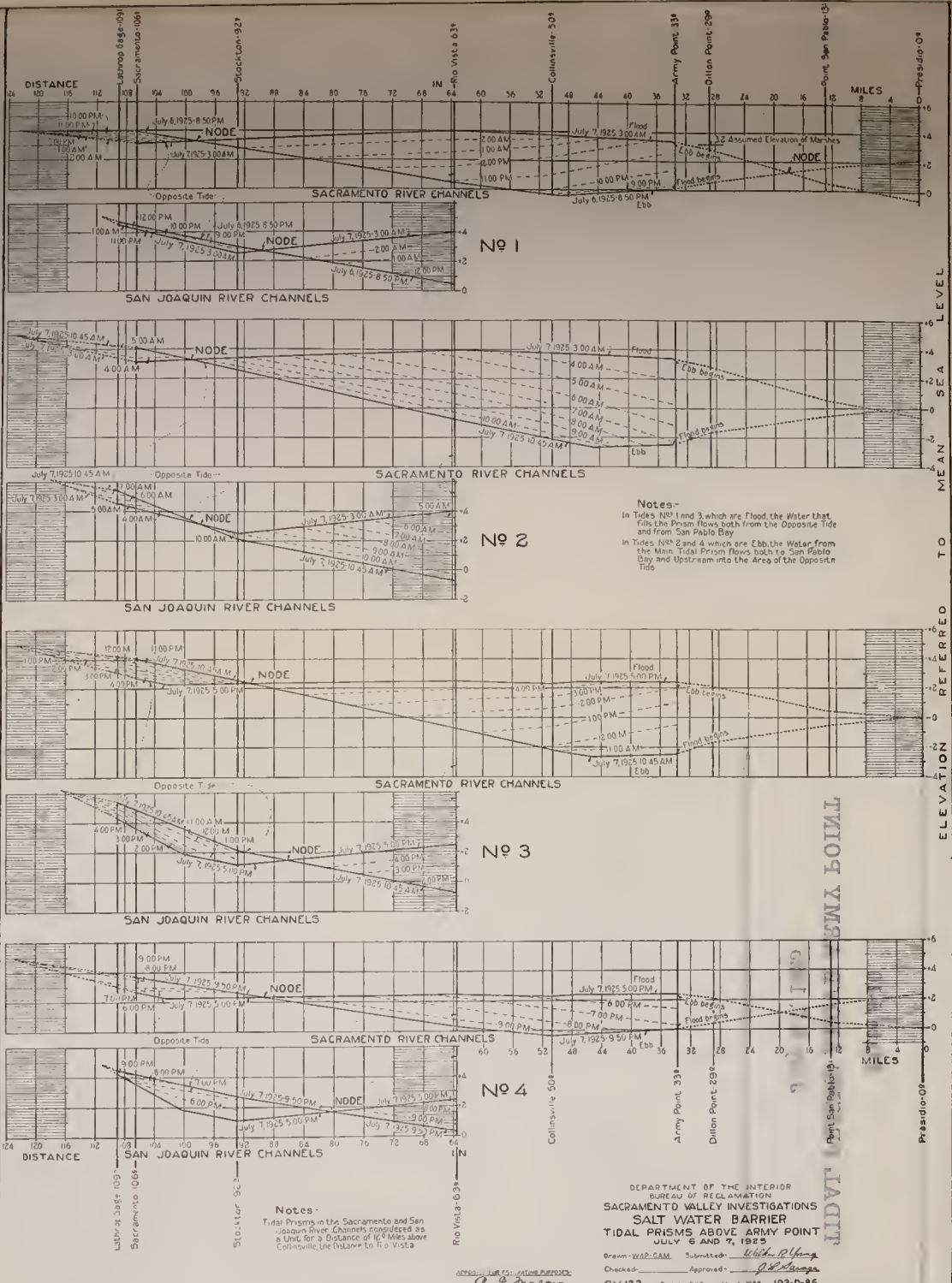

DISTANCE
MILES
Latrop Gage-109
Sacramento-106
Stockton-92
Rio Vista 63
Collinsville-50
Army Point 33
Dillon Point-29
Point San Pablo-13
Presidio-0
SACRAMENTO RIVER CHANNELS
SAN JOAQUIN RIVER CHANNELS
Opposite Tide
NODE
Flood
Ebb
Flood begins
Ebb begins
July 6,1925-8.50 PM
July 7,1925-3.00 AM
July 7,1925-10.45 AM
July 7,1925-5.00 PM
July 7,1925-9.50 PM
12 Assumed Elevation of Marshes
Nº 1
Nº 2
Nº 3
Nº 4
MEAN SEA LEVEL
ELEVATION REFERRED TO
Notes-
In Tides Nos 1 and 3, which are Flood, the Water that fills the Prism flows both from the Opposite Tide and from San Pablo Bay
In Tides Nos 2 and 4 which are Ebb, the Water from the Main Tidal Prism flows both to San Pablo Bay and Upstream into the Area of the Opposite Tide
Notes-
Tidal Prisms in the Sacramento and San Joaquin River Channels considered as a Unit, for a Distance of 109 Miles above Collinsville, the Distance to Rio Vista
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS
SALT WATER BARRIER
TIDAL PRISMS ABOVE ARMY POINT
JULY 6 AND 7, 1925
Drawn-WAP-CAM
Submitted-
Checked-
Approved-
SV-133
Berkeley, California March 1926
193-D-86
APPROVED FOR TECHNICAL PURPOSES
CHIEF ENGINEER

PLATE 5-10

Plate 5-11

SLOPE AND VELOCITY CURVES, ARMY POINT AND POINT SAN PABLO

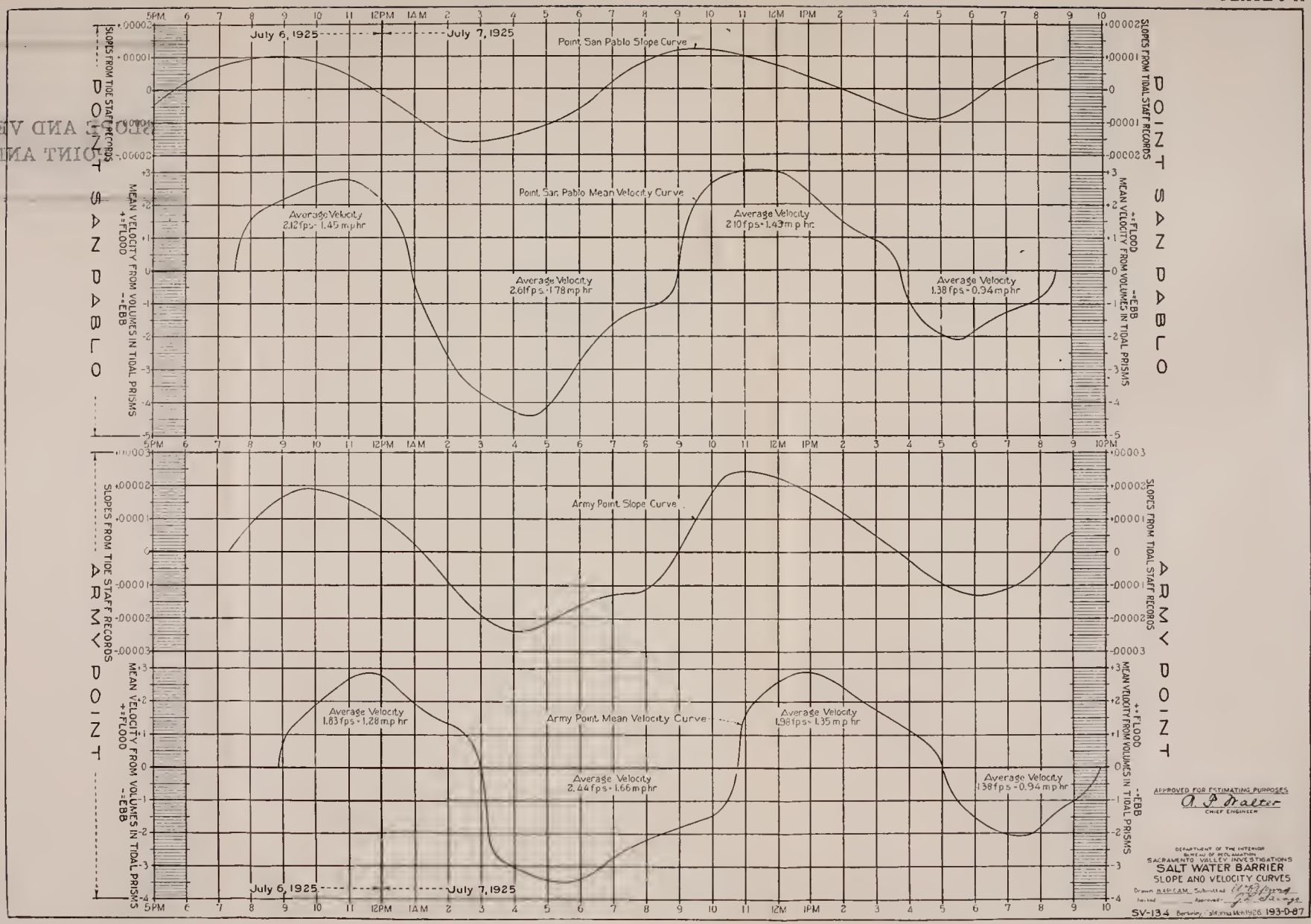
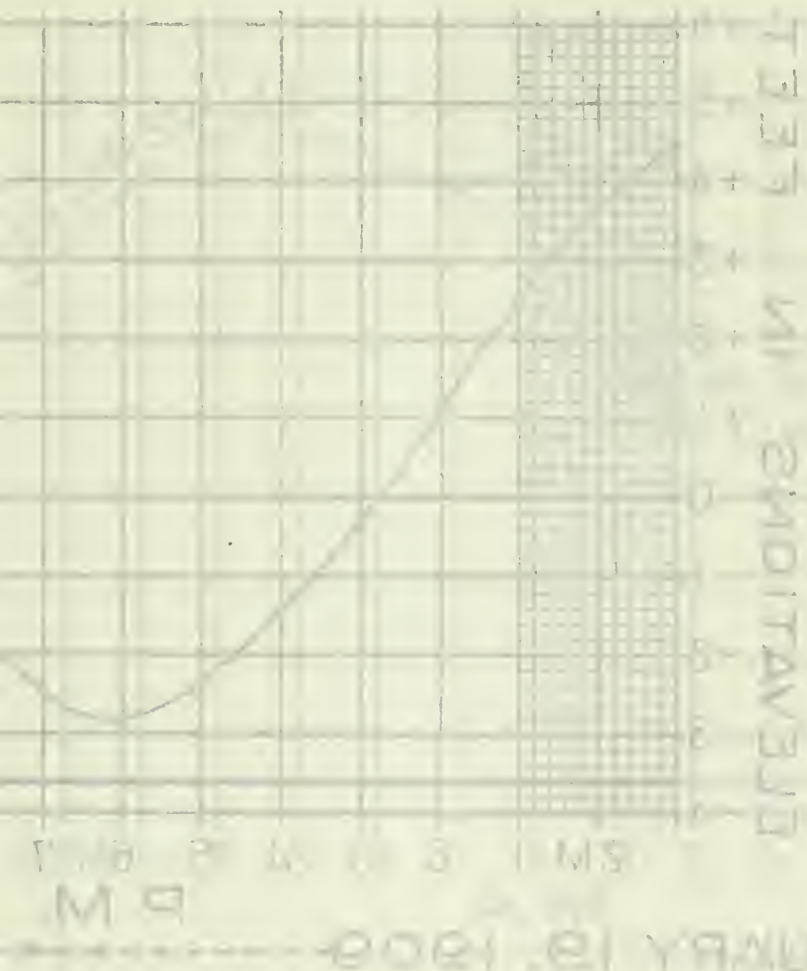
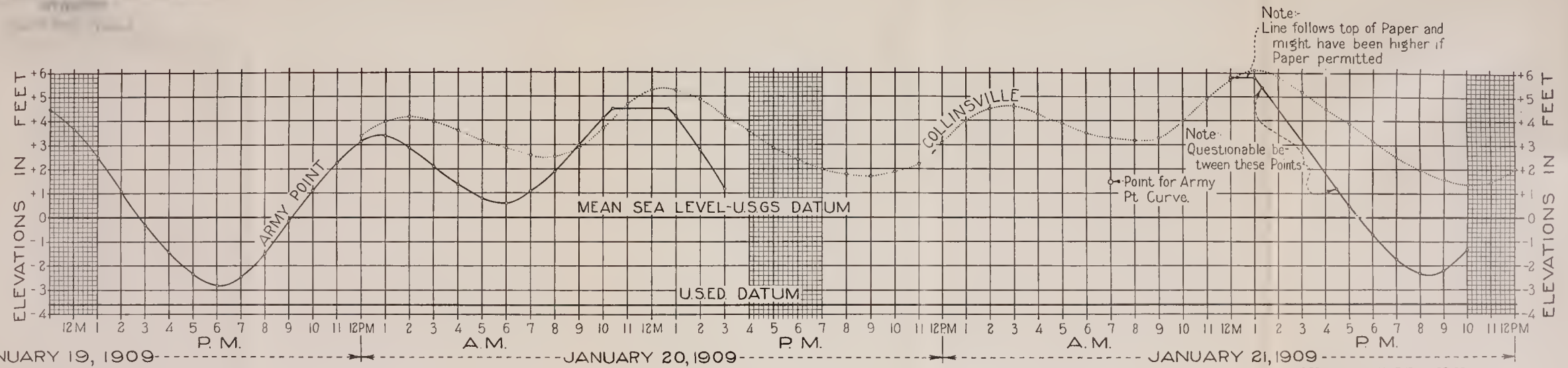

POINT SAN PABLO
July 6, 1925
July 7, 1925
Point San Pablo Slope Curve
SLOPES FROM TIDAL STAFF RECORDS
Point San Pablo Mean Velocity Curve
MEAN VELOCITY FROM VOLUMES IN TIDAL PRISMS
+=FLOOD
--EBB
Average Velocity
2.12 fps - 1.45 m.p.hr
Average Velocity
2.61 fps - 1.78 m.p.hr
Average Velocity
2.10 fps - 1.43 m.p.hr
Average Velocity
1.38 fps - 0.94 m.p.hr
ARMY POINT
Army Point Slope Curve
Army Point Mean Velocity Curve
Average Velocity
1.83 fps - 1.28 m.p.hr
Average Velocity
2.44 fps - 1.66 m.p.hr
Average Velocity
1.98 fps - 1.35 m.p.hr
Average Velocity
1.38 fps - 0.94 m.p.hr
APPROVED FOR ESTIMATING PURPOSES
O. P. Walter
CHIEF ENGINEER
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS
SALT WATER BARRIER
SLOPE AND VELOCITY CURVES
SV-13.4 Berkeley, California March 1926. 193-D-87

Plate 5-12

ARMY POINT AND COLLINSVILLE GAGE HEIGHTS

January, 1909, Flood




Note:-
Line follows top of Paper and might have been higher if Paper permitted
ELEVATIONS IN FEET
+6 +5 +4 +3 +2 +1 0 -1 -2 -3 -4
ARMY POINT
COLLINSVILLE
MEAN SEA LEVEL-U.S.G.S. DATUM
U.S.E.D. DATUM
Note:- Questionable between these Points
Point for Army Pt Curve.
12M 1 2 3 4 5 6 7 8 9 10 11 12PM 1 2 3 4 5 6 7 8 9 10 11 12M 1 2 3 4 5 6 7 8 9 10 11 12PM 1 2 3 4 5 6 7 8 9 10 11 12PM
P.M. A.M. P.M. A.M. P.M.
JANUARY 19, 1909 JANUARY 20, 1909 JANUARY 21, 1909

APPROVED FOR ESTIMATING PURPOSES:-

R. F. Walter.

CHIEF ENGINEER.

DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS

SALT WATER BARRIER

ARMY POINT AND, COLLINSVILLE GAGE HEIGHTS DURING JAN 1909 FLOOD-FROM U.S. ENGINEER DEPARTMENT RECORDS - AUG. 25, 1924

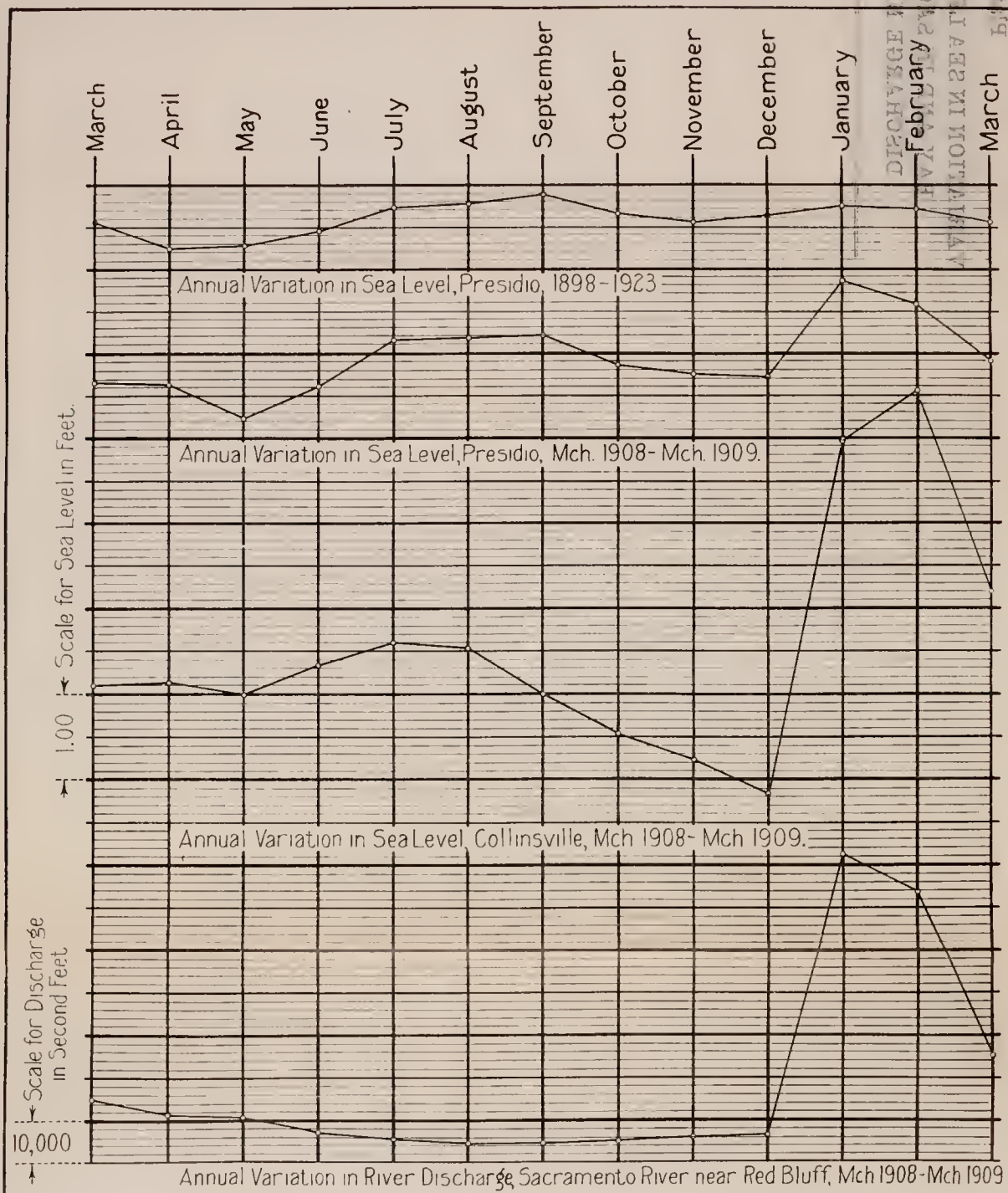
Drawn:- N.B.H.-C.A.M. Submitted:- W.R. Young

Checked:- _____ Approved:- J.D. Savage.

SV-135 Berkeley, California Mch 1926. 193-D-88

Plate 5-13

VARIATION IN SEA LEVEL IN SAN FRANCISCO BAY AND IN SACRAMENTO RIVER DISCHARGE NEAR RED BLUFF



Note:-
Reproduced from Curves accompanying Letter of Dec 18, 1925 from Mr R.L Faris, Acting Director, U S Coast and Geodetic Survey.

APPROVED FOR ESTIMATING PURPOSES
A. F. Walter
CHIEF ENGINEER

DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS
SALT WATER BARRIER
VARIATION IN SEA LEVEL IN S.F BAY AND IN SACRAMENTO RIVER DISCHARGE NEAR RED BLUFF

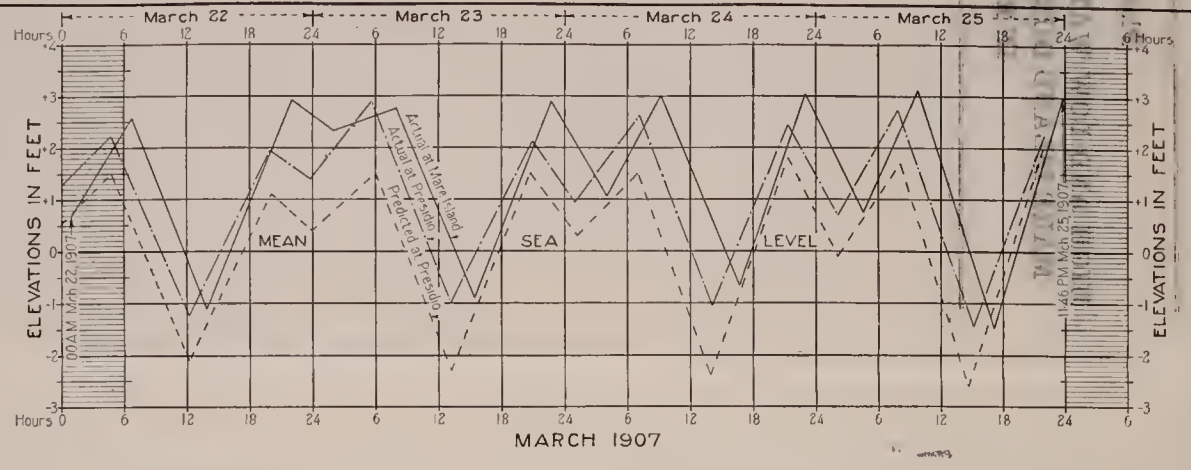
Drawn WRY-CAM Submitted- W R Young
Checked Approved- J.B. Savage

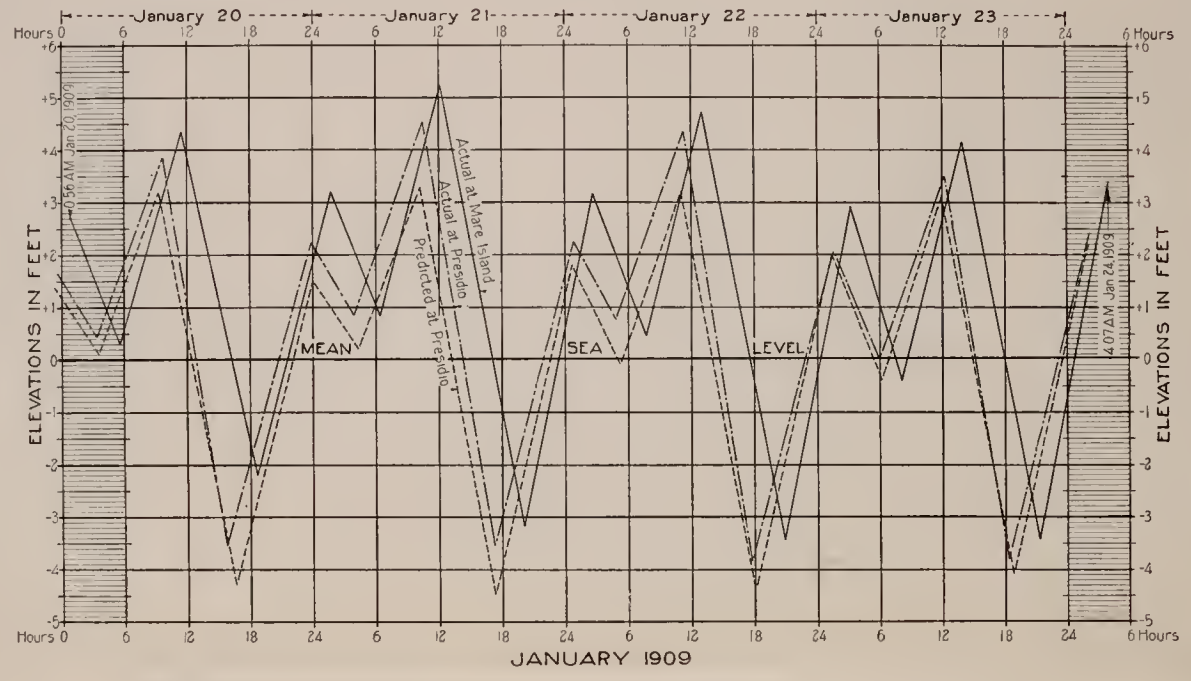
SV-136 Berkeley, California Mch 1926 193-D-89

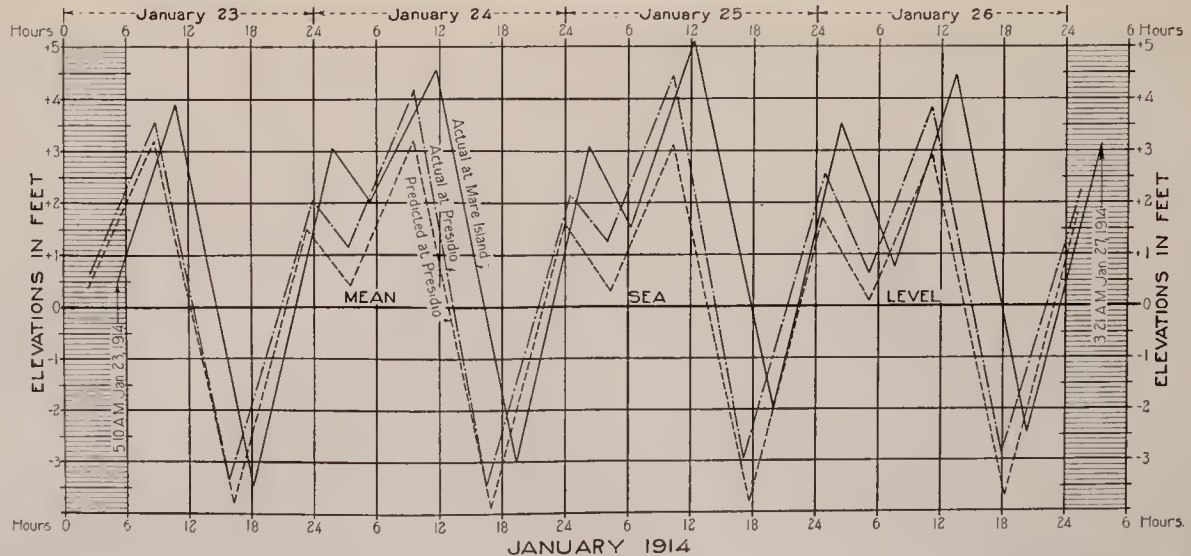
PLATE 5-13

Plate 5-14

HIGH AND LOW WATER AT PRESIDIO AND MARE ISLAND DURING FLOOD PERIODS IN RIVERS


March 22
March 23
March 24
March 25
Hours 0 6 12 18 24 6 12 18 24 6 12 18 24 6 12 18 24 6 Hours
ELEVATIONS IN FEET
+4 +3 +2 +1 0 -1 -2 -3
MEAN SEA LEVEL
Actual at Mare Island
Actual at Presidio
Predicted at Presidio
0.0 A.M. Mch 22, 1907
11.46 P.M. Mch 25, 1907
MARCH 1907


January 20
January 21
January 22
January 23
Hours 0 6 12 18 24 6 12 18 24 6 12 18 24 6 12 18 24 6 Hours
ELEVATIONS IN FEET
+6 +5 +4 +3 +2 +1 0 -1 -2 -3 -4 -5
MEAN SEA LEVEL
Actual at Mare Island
Actual at Presidio
Predicted at Presidio
0.56 A.M. Jan 20, 1909
4.07 A.M. Jan 24, 1909
JANUARY 1909


January 23
January 24
January 25
January 26
Hours 0 6 12 18 24 6 12 18 24 6 12 18 24 6 12 18 24 6 Hours
ELEVATIONS IN FEET
+5 +4 +3 +2 +1 0 -1 -2 -3
MEAN SEA LEVEL
Actual at Mare Island
Actual at Presidio
Predicted at Presidio
5.10 A.M. Jan 23, 1914
3.21 A.M. Jan 27, 1914
JANUARY 1914

Note:-
The Graphs are not true Graphs.
Maximum and Minimum Elevations reached are, for convenience, joined by straight Lines.

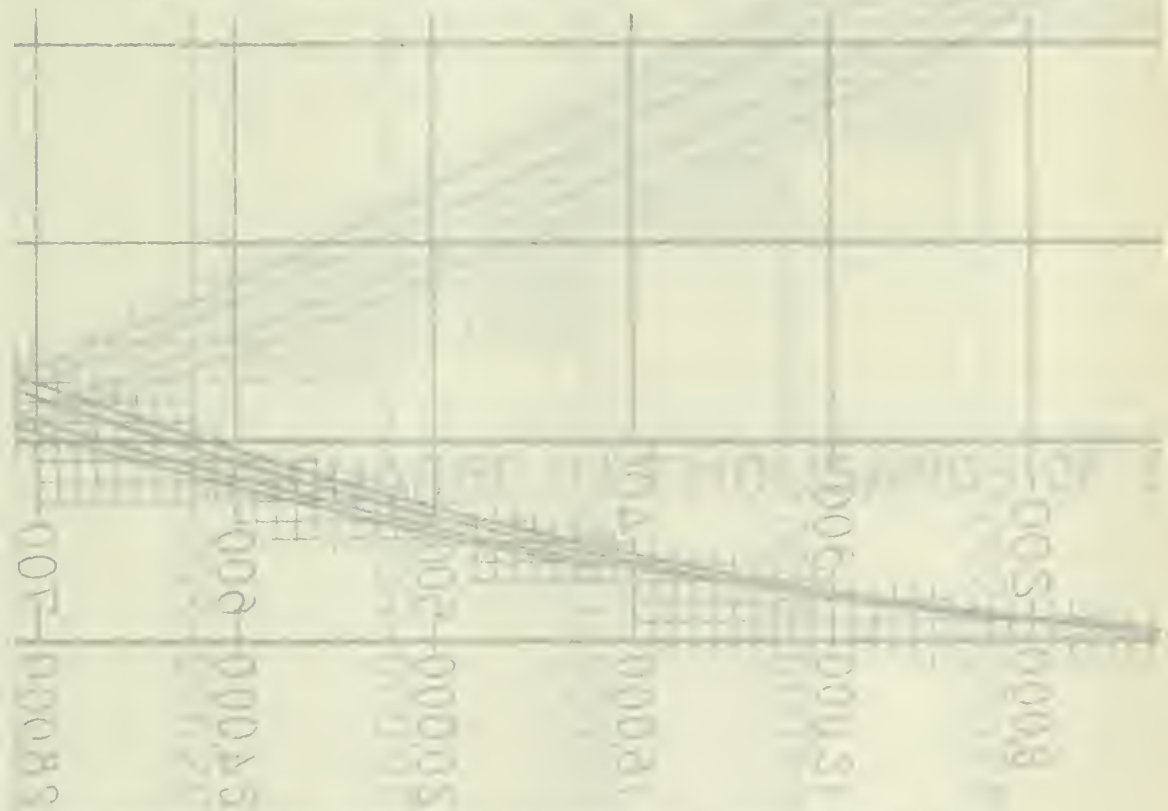
APPROVED FOR ESTIMATING PURPOSES.
A. P. Davis
CHIEF ENGINEER

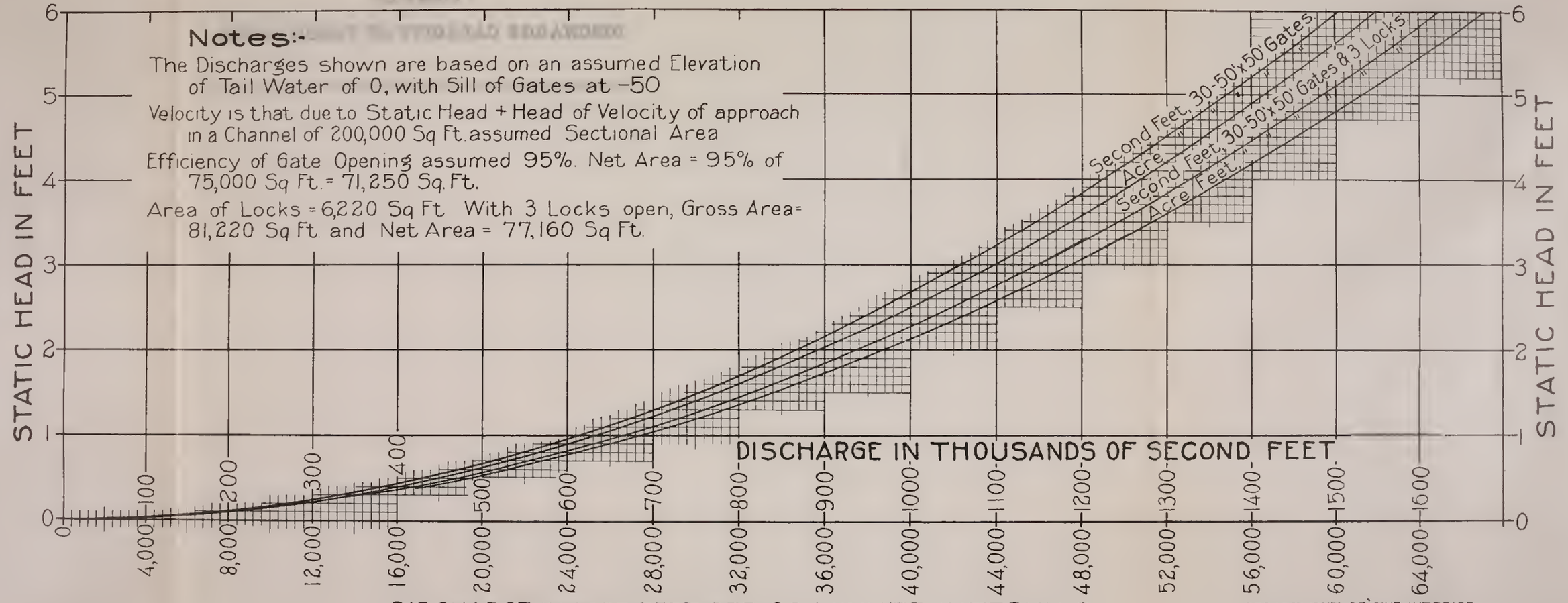
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS
SALT WATER BARRIER
HIGH AND LOW WATER AT PRESIDIO AND MARE ISLAND
DURING FLOOD PERIODS IN RIVERS
Drawn-WAP-CAM Submitted-
Checked- Approved-
SV-137 Berkeley, California Mch 1926 193-D-90

PLATE 5-14

Plate 5-15

DISCHARGE CAPACITY OF FLOOD GATES




Notes:-
The Discharges shown are based on an assumed Elevation of Tail Water of 0, with Sill of Gates at -50
Velocity is that due to Static Head + Head of Velocity of approach in a Channel of 200,000 Sq Ft. assumed Sectional Area
Efficiency of Gate Opening assumed 95%. Net Area = 95% of 75,000 Sq Ft. = 71,250 Sq. Ft.
Area of Locks = 6,220 Sq Ft With 3 Locks open, Gross Area = 81,220 Sq Ft. and Net Area = 77,160 Sq Ft.
Second Feet, 30-50'x50' Gates
Acre Feet, 30-50'x50' Gates
Second Feet, 30-50'x50' Gates & 3 Locks
Acre Feet, 30-50'x50' Gates & 3 Locks
STATIC HEAD IN FEET
DISCHARGE IN THOUSANDS OF SECOND FEET
DISCHARGE IN ACRE FEET PER 30 MINUTE INTERVALS

APPROVED FOR ESTIMATING PURPOSES:-

A. F. Walter

CHIEF ENGINEER.

DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS

SALT WATER BARRIER
DISCHARGE CAPACITY OF FLOOD GATES

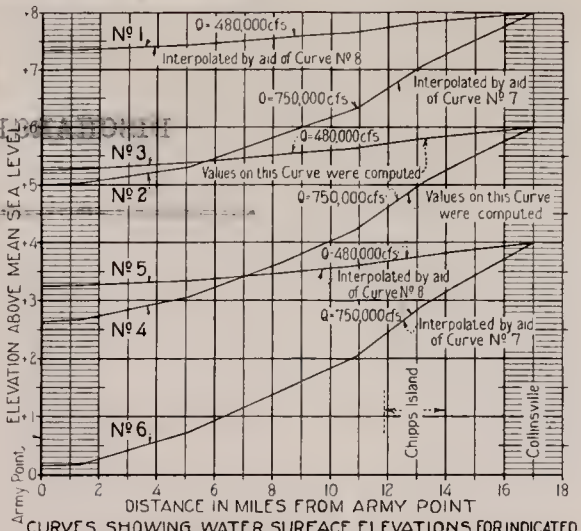
Drawn: W.A.P.-C.A.M. Submitted: W. P. Harding

Checked: _____ Approved: J. D. Savage

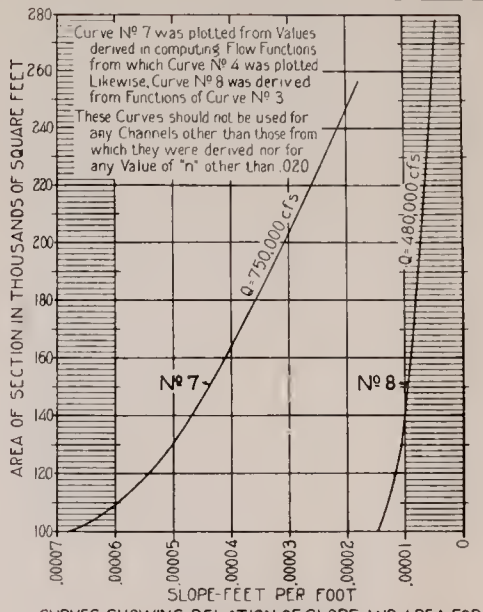
SV-138 Berkeley, California Mch. 1926. 193-D-91

Plate 5-16

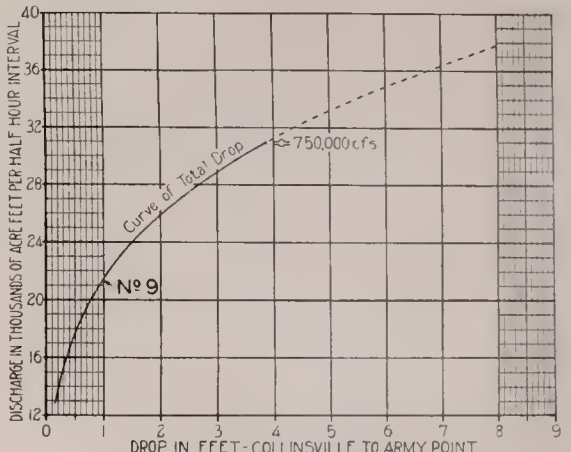
DISCHARGE AND SLOPE CURVES



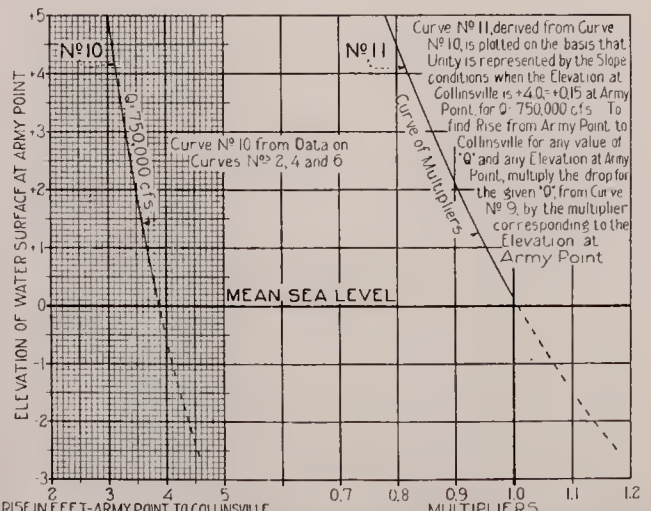
CURVES SHOWING WATER SURFACE ELEVATIONS FOR INDICATED VALUES OF "Q" BETWEEN ARMY POINT AND COLLINSVILLE


Curve Nº 7 was plotted from Values derived in computing Flow Functions from which Curve Nº 4 was plotted Likewise, Curve Nº 8 was derived from Functions of Curve Nº 3
These Curves should not be used for any Channels other than those from which they were derived nor for any Value of "n" other than .020
Q=750,000 cfs
Q=480,000 cfs
Nº 7
Nº 8
AREA OF SECTION IN THOUSANDS OF SQUARE FEET
SLOPE-FEET PER FOOT

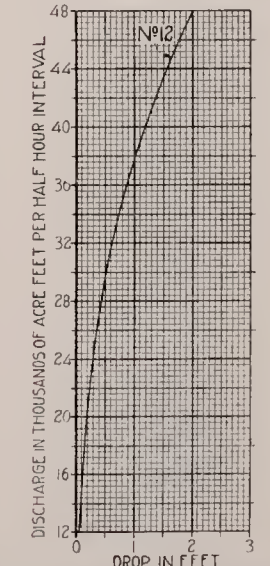
CURVES SHOWING RELATION OF SLOPE AND AREA FOR GIVEN VALUES OF "Q"


Curve of Total Drop
750,000 cfs
Nº 9
DISCHARGE IN THOUSANDS OF ACRE FEET PER HALF HOUR INTERVAL
DROP IN FEET-COLLINSVILLE TO ARMY POINT

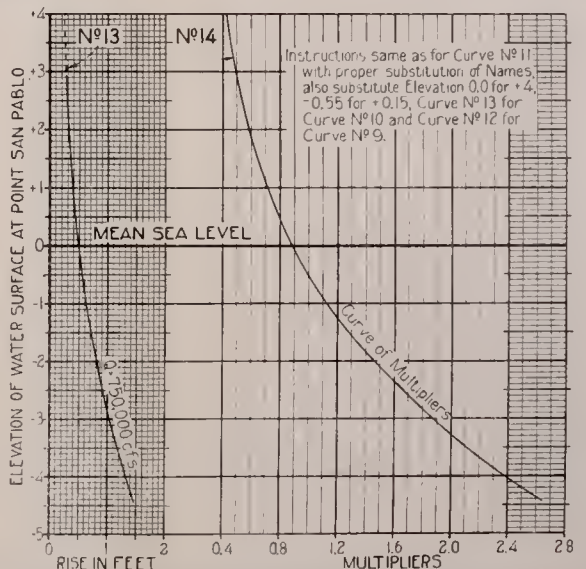
CURVE OF TOTAL DROP-ARMY POINT TO COLLINSVILLE-FOR DIFFERENT VALUES OF "Q" WITH CONSTANT ELEVATION OF +4.0 AT COLLINSVILLE


Nº 10
Nº 11
Curve Nº 11, derived from Curve Nº 10, is plotted on the basis that Unity is represented by the Slope conditions when the Elevation at Collinsville is +4.0 - +0.15 at Army Point for Q-750,000 cfs To find Rise from Army Point to Collinsville for any value of "Q" and any Elevation at Army Point, multiply the drop for the given "Q", from Curve Nº 9, by the multiplier corresponding to the Elevation at Army Point
Curve Nº 10 from Data on Curves Nºs 2, 4 and 6
Q=750,000 cfs
Curve of Multipliers
MEAN SEA LEVEL
ELEVATION OF WATER SURFACE AT ARMY POINT
RISE IN FEET-ARMY POINT TO COLLINSVILLE
MULTIPLIERS

CURVES SHOWING RISE IN FEET, ARMY POINT TO COLLINSVILLE WITH Q=750,000 CFS AND DIFFERENT ELEVATIONS OF WATER SURFACE AT ARMY POINT



CURVE OF TOTAL DROP SECTION "A" TO POINT SAN PABLO FOR DIFFERENT VALUES OF "Q" WITH CONSTANT ELEVATION OF 0.0 AT SECTION "A"
(See Notes)


Nº 13
Nº 14
Instructions same as for Curve Nº 11 with proper substitution of Names, also substitute Elevation 0.0 for +4, -0.55 for +0.15, Curve Nº 13 for Curve Nº 10 and Curve Nº 12 for Curve Nº 9.
MEAN SEA LEVEL
Curve of Multipliers
Q=750,000 cfs
ELEVATION OF WATER SURFACE AT POINT SAN PABLO
RISE IN FEET
MULTIPLIERS

CURVES SHOWING RISE IN FEET-POINT SAN PABLO TO SECTION "A" WITH Q=750,000 CFS AND DIFFERENT ELEVATIONS OF WATER SURFACE AT POINT SAN PABLO
(See Notes)

Notes

All Elevations are referred to Mean Sea Level

Kutter's formula with "n"=.020 used in computation of Flow

Section "A" is located 4½ Miles below Mare Island Light. Effective Flow Channel assumed to extend from the 6' depth at Low Water on the South Side to the 9' depth on the North. Section taken from U.S.C.and G.S. Chart Nº 5533, issue of June 1925

One Cubic Foot per Second = .0413 Acre Feet per Half Hour

APPROVED FOR ESTIMATING PURPOSES
A. P. Walter
CHIEF ENGINEER

DEPARTMENT OF PUBLIC WORKS
DIVISION OF WATER RESOURCES
SACRAMENTO VALLEY INVESTIGATIONS

SALT WATER BARRIER
DISCHARGE AND SLOPE CURVE

Drawn by M.F.S.W. Submitted: W.W. Young
Checked Approved: J.B. Lippincott

SV-139 Berkeley, California March 1926 1930-92

Plate 5-17

FLOOD DISCHARGE AT POINT SAN PABLO

Water Surface Elevations for "Q"=750,000 c. f. s.

ELEVATIONS AT COLLINSVILLE-U.S. ENGINEER DATUM

17.12 USED — Top of Levee recommended for adoption by Flood Control Office, State Dept of Public Works. See Plate 5-20.

13.0 USED — Elevation estimated by Flood Control Office, State Dept. of Public Works, which a Flood 50% greater than that of 1907 might reach if confined within Sacramento Project Flood Channels. See Plate 5-20.

12.1 USED — Extreme High Tide assumed for Sacramento River Flood Control Project by US Army Engineers. See Plate 5-21. High Tide assumed by Flood Control Office, State Dept. of Public Works. See Plate 5-20.

10.7 USED — Flood Plane adopted for Sacramento River Flood Control Project by U.S. Army Engineers. See Plate 5-21.

9.7 USED — Extreme High Water on Jan. 21, 1909. See Plate 5-20.

DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS

SALT WATER BARRIER

FLOOD DISCHARGE AT POINT SAN PABLO

WATER SURFACE ELEVATIONS FOR "Q" = 750,000 C.F.S.

Drawn - WAP - CAM. Submitted - Walter P. Young
Checked - Approved - J. D. Savage

SV-140 193-D-93

Berkeley, California March 1926

APPROVED FOR ESTIMATING PURPOSES
A. F. Walter
CHIEF ENGINEER

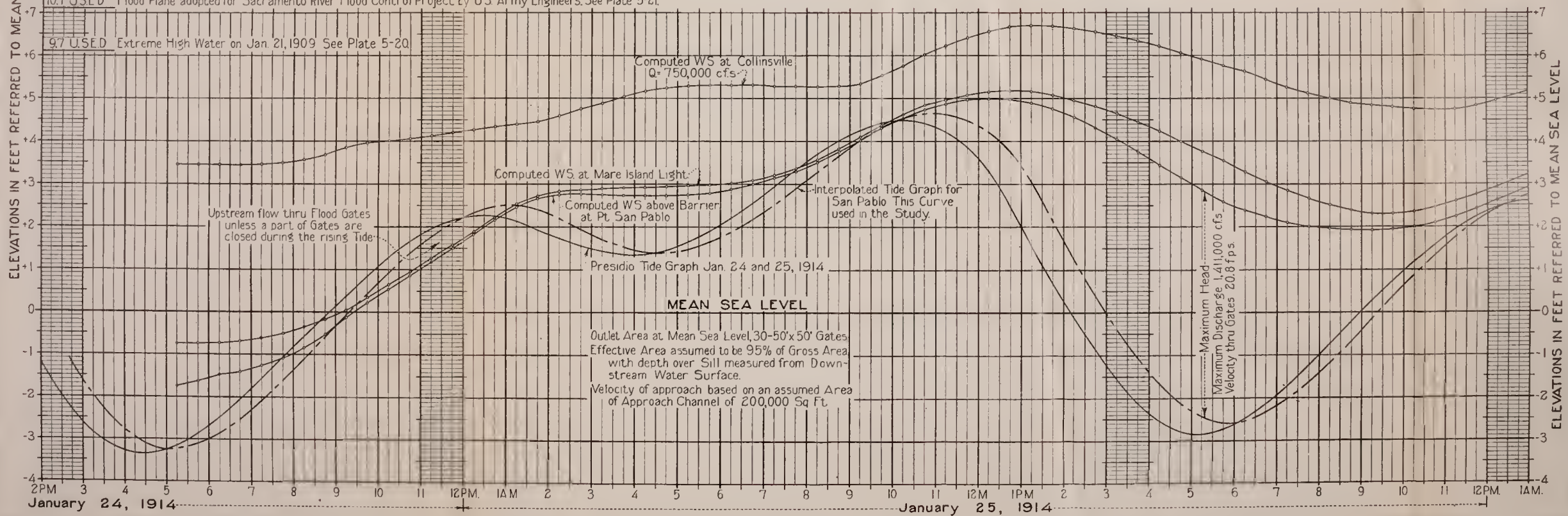

ELEVATIONS IN FEET REFERRED TO MEAN SEA LEVEL
+14
13.52
+13
+12
+11
+10
+9
+8
+7
+6
+5
+4
+3
+2
+1
0
-1
-2
-3
-4
Computed WS at Collinsville Q = 750,000 c.f.s.
Computed WS at Mare Island Light
Computed WS above Barrier at Pt San Pablo
Interpolated Tide Graph for San Pablo This Curve used in the Study.
Upstream flow thru Flood Gates unless a part of Gates are closed during the rising Tide
Presidio Tide Graph Jan. 24 and 25, 1914
MEAN SEA LEVEL
Outlet Area at Mean Sea Level, 30-50'x50' Gates
Effective Area assumed to be 95% of Gross Area with depth over Sill measured from Downstream Water Surface.
Velocity of approach based on an assumed Area of Approach Channel of 200,000 Sq Ft.
Maximum Head
Maximum Discharge 1,411,000 cfs
Velocity thru Gates 20.8 fps
2PM 3 4 5 6 7 8 9 10 11 12PM. 1AM 2 3 4 5 6 7 8 9 10 11 12M 1PM 2 3 4 5 6 7 8 9 10 11 12PM. 1AM.
January 24, 1914
January 25, 1914

Plate 5-18

FLOOD DISCHARGE AT ARMY POINT

Water Surface Elevation for "Q"=750,000 c. f. s.

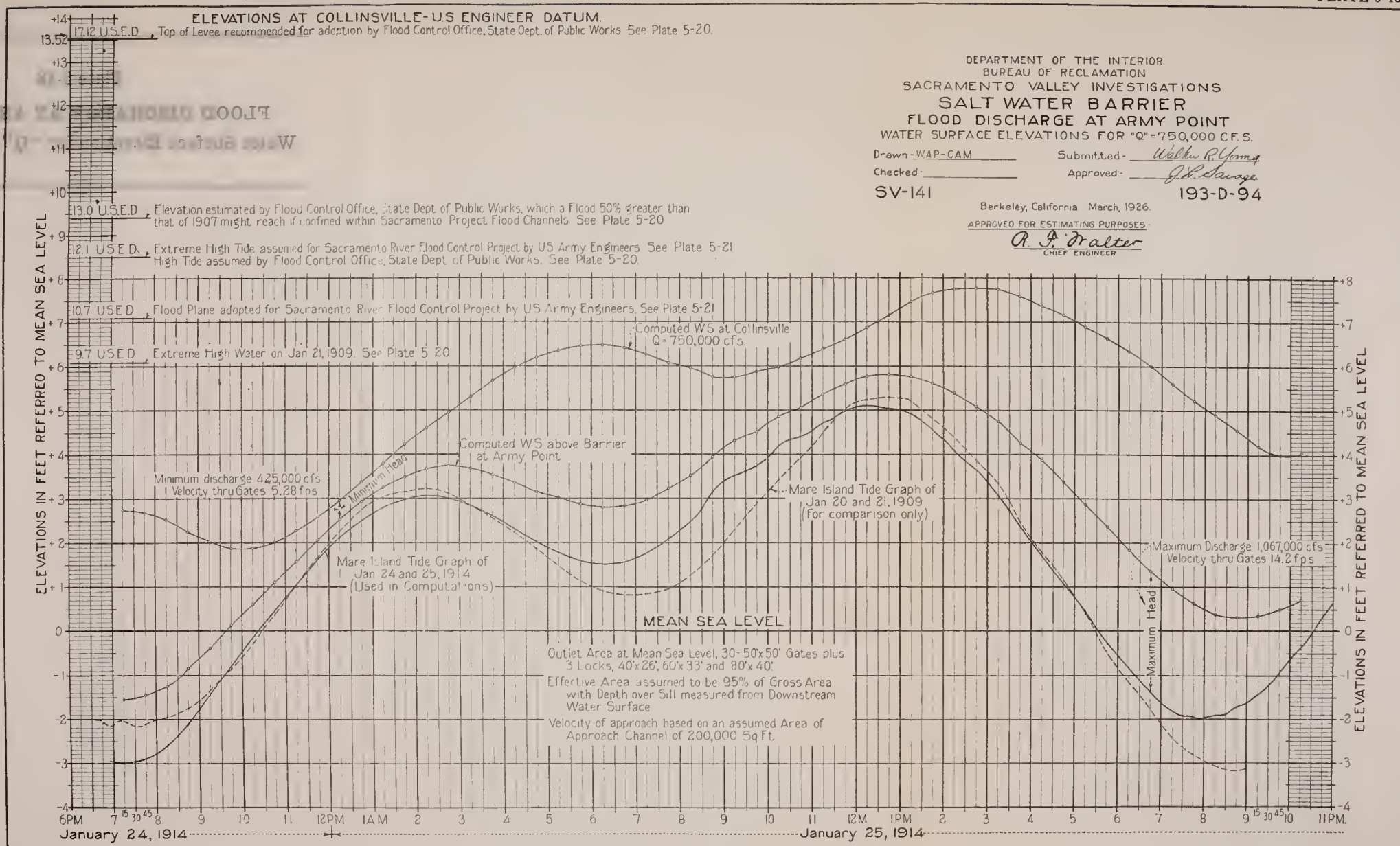
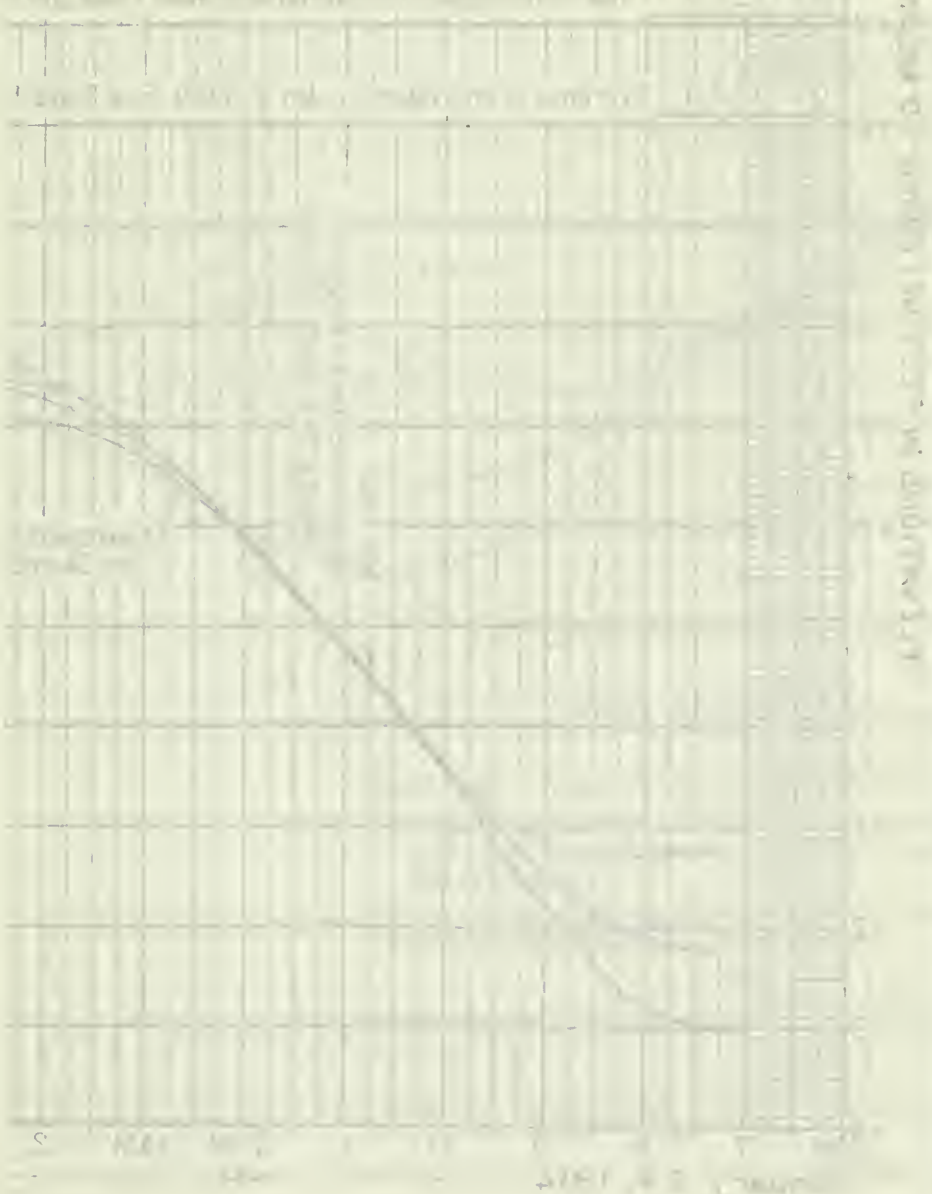

ELEVATIONS AT COLLINSVILLE-U.S ENGINEER DATUM.
17.12 U.S.E.D Top of Levee recommended for adoption by Flood Control Office, State Dept. of Public Works See Plate 5-20.
13.52
13.0 U.S.E.D Elevation estimated by Flood Control Office, State Dept of Public Works, which a Flood 50% greater than that of 1907 might reach if confined within Sacramento Project Flood Channels See Plate 5-20
12.1 U.S.E.D. Extreme High Tide assumed for Sacramento River Flood Control Project by US Army Engineers See Plate 5-21
High Tide assumed by Flood Control Office, State Dept of Public Works. See Plate 5-20.
10.7 USED Flood Plane adopted for Sacramento River Flood Control Project by US Army Engineers. See Plate 5-21
9.7 USED Extreme High Water on Jan 21, 1909. See Plate 5-20
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS
SALT WATER BARRIER
FLOOD DISCHARGE AT ARMY POINT
WATER SURFACE ELEVATIONS FOR "Q"=750,000 C.F.S.
Drawn - WAP-CAM
Checked -
Submitted - Walter P. Young
Approved - J. B. Savage
SV-141
193-D-94
Berkeley, California March, 1926.
APPROVED FOR ESTIMATING PURPOSES -
R. F. Walter
CHIEF ENGINEER
Computed WS at Collinsville Q=750,000 cfs.
Computed WS above Barrier at Army Point
Minimum discharge 425,000 cfs
Velocity thru Gates 5.28 fps
Minimum Head
Mare Island Tide Graph of Jan 24 and 25, 1914 (Used in Computations)
Mare Island Tide Graph of Jan 20 and 21, 1909 (For comparison only)
Maximum Discharge 1,067,000 cfs
Velocity thru Gates 14.2 fps
Maximum Head
MEAN SEA LEVEL
Outlet Area at Mean Sea Level, 30-50'x50' Gates plus 3 Locks, 40'x26', 60'x33' and 80'x40'.
Effective Area assumed to be 95% of Gross Area with Depth over Sill measured from Downstream Water Surface
Velocity of approach based on an assumed Area of Approach Channel of 200,000 Sq Ft.
ELEVATIONS IN FEET REFERRED TO MEAN SEA LEVEL
ELEVATIONS IN FEET REFERRED TO MEAN SEA LEVEL
+14 +13 +12 +11 +10 +9 +8 +7 +6 +5 +4 +3 +2 +1 0 -1 -2 -3 -4
6PM 7 15 30 45 8 9 10 11 12PM 1AM 2 3 4 5 6 7 8 9 10 11 12M 1PM 2 3 4 5 6 7 8 9 15 30 45 10 11PM.
January 24, 1914
January 25, 1914

Plate 5-19

FLOOD DISCHARGE AT ARMY POINT

Water Surface Elevation for "Q"=500,000 c. f. s.



ELEVATIONS AT COLLINSVILLE-US ENGINEER DATUM

DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS

SALT WATER BARRIER
FLOOD DISCHARGE AT ARMY POINT
WATER SURFACE ELEVATIONS FOR "Q" = 500,000 CFS

Drawn - WAP - CAM
Checked -
Submitted - Walter R. Young
Approved - J. L. Savage

SV-142
193-D-95

Berkeley, California March 1926

APPROVED FOR ESTIMATING PURPOSES -
A. P. Drexler
CHIEF ENGINEER

+17.12 U.S.E.D. — Top of Levee recommended for adoption by Flood Control Office, State Dept of Public Works See Plate 5-20

+13.52

+13.0 U.S.E.D. — Elevation estimated by Flood Control Office, State Dept of Public Works, which a Flood 50% greater than that of 1907 might reach if confined within Sacramento Project Flood Channels See Plate 5-20

+12.1 U.S.E.D. — Extreme High Tide assumed for Sacramento River Flood Control Project by US Army Engineers See Plate 5-21
High Tide assumed by Flood Control Office, State Dept. of Public Works See Plate 5-20

+10.7 U.S.E.D. — Flood Plane adopted for Sacramento River Flood Control Project by US Army Engineers See Plate 5-21

+9.7 U.S.E.D. — Extreme High Water on Jan 21, 1909 See Plate 5-20

ELEVATIONS IN FEET REFERRED TO MEAN SEA LEVEL

+14 +13 +12 +11 +10 +9 +8 +7 +6 +5 +4 +3 +2 +1 0 -1 -2 -3 -4

Computed WS at Collinsville Q = 500,000 cfs

Computed WS above Barrier at Army Point

Succeeding Tidal Cycle

Mare Island Tide Graph Jan 24 and 25, 1914

Min Head
Minimum discharge 40,000 cfs
Velocity thru Gates 0.56 fps

Max Head

Maximum discharge 895,000 cfs
Velocity thru Gates 12.9 fps

MEAN SEA LEVEL

Outlet Area at Mean Sea Level, 30-50'x 50' Gates
Effective Area assumed to be 95% of Gross Area, with Depth over Sill measured from Downstream Water Surface
Velocity of approach based on an assumed Area of Approach Channel of 200,000 Sq Ft

6PM 7 8 9 10 11 12PM 1AM 2 3 4 5 6 7 8 9 10 11 12M 1PM 2 3 4 5 6 7 8 9 10 11 12PM

January 24, 1914 ---------- January 25, 1914

Plate 5-20

SACRAMENTO RIVER FLOOD CONTROL PROJECT (STATE)

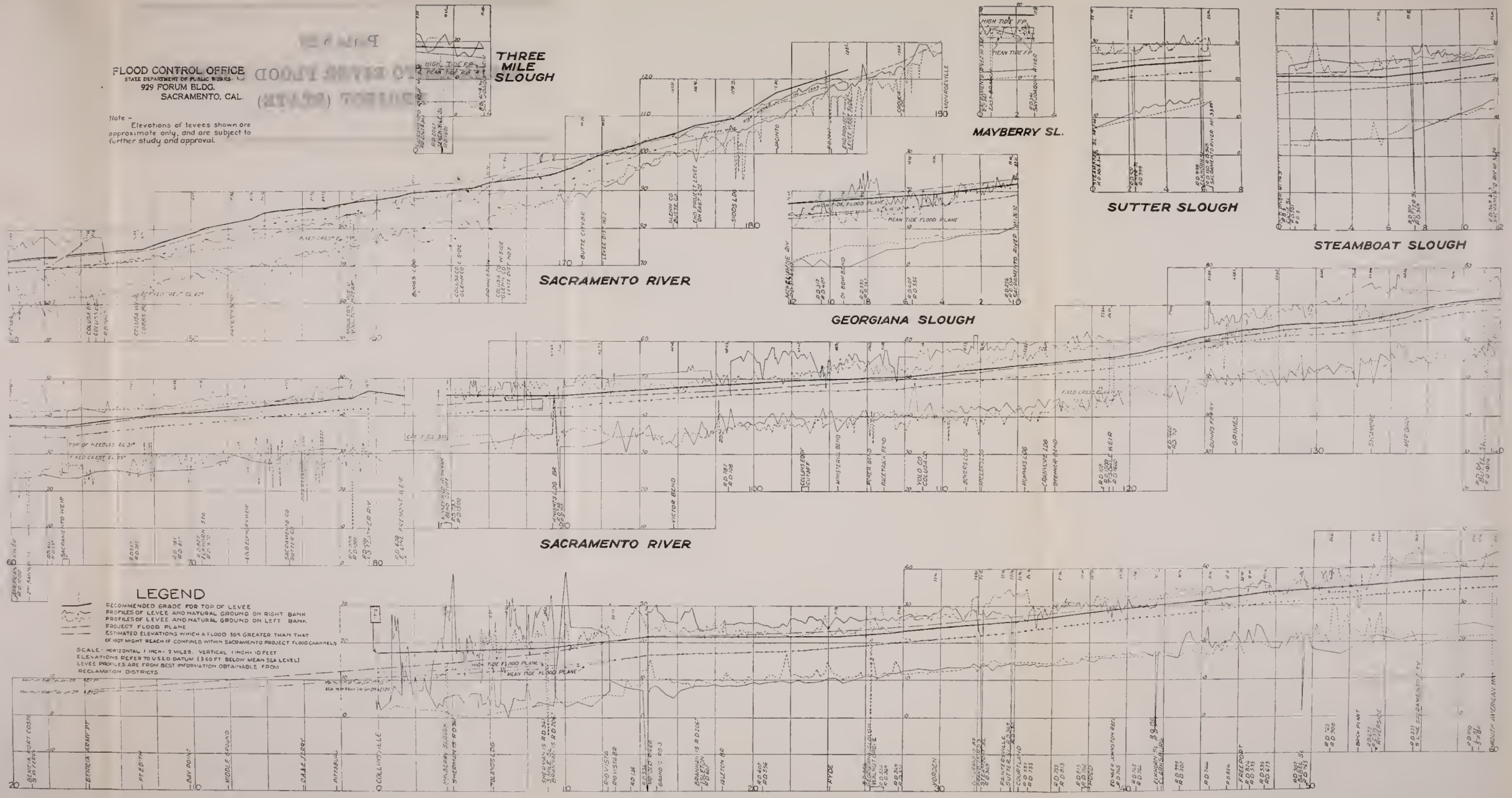
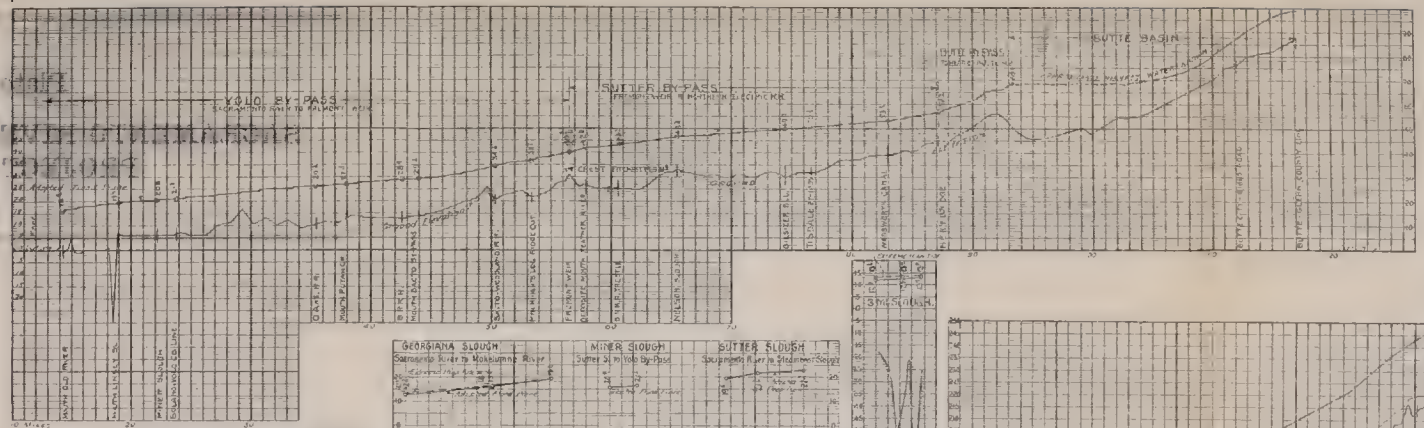

FLOOD CONTROL OFFICE
STATE DEPARTMENT OF PUBLIC WORKS
929 FORUM BLDG.
SACRAMENTO, CAL.
Note –
Elevations of levees shown are approximate only, and are subject to further study and approval.
THREE MILE SLOUGH
MAYBERRY SL.
SUTTER SLOUGH
STEAMBOAT SLOUGH
SACRAMENTO RIVER
GEORGIANA SLOUGH
SACRAMENTO RIVER
LEGEND
RECOMMENDED GRADE FOR TOP OF LEVEE
PROFILES OF LEVEE AND NATURAL GROUND ON RIGHT BANK
PROFILES OF LEVEE AND NATURAL GROUND ON LEFT BANK
PROJECT FLOOD PLANE
ESTIMATED ELEVATIONS WHICH A FLOOD 50% GREATER THAN THAT OF 1907 MIGHT REACH IF CONFINED WITHIN SACRAMENTO PROJECT FLOOD CHANNELS
SCALE - HORIZONTAL 1 INCH = 2 MILES. VERTICAL 1 INCH = 10 FEET
ELEVATIONS REFER TO U.S.C.& G.S. DATUM (3.60 FT. BELOW MEAN SEA LEVEL)
LEVEE PROFILES ARE FROM BEST INFORMATION OBTAINABLE FROM RECLAMATION DISTRICTS
HIGH TIDE FLOOD PLANE
MEAN TIDE FLOOD PLANE

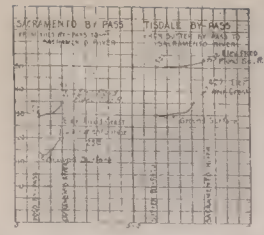
Plate 5-21

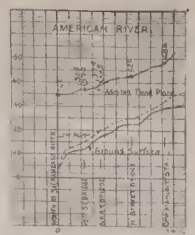
SACRAMENTO RIVER FLOOD CONTROL PROJECT (ARMY)

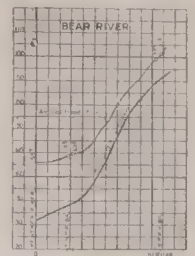
WAR DEPARTMENT

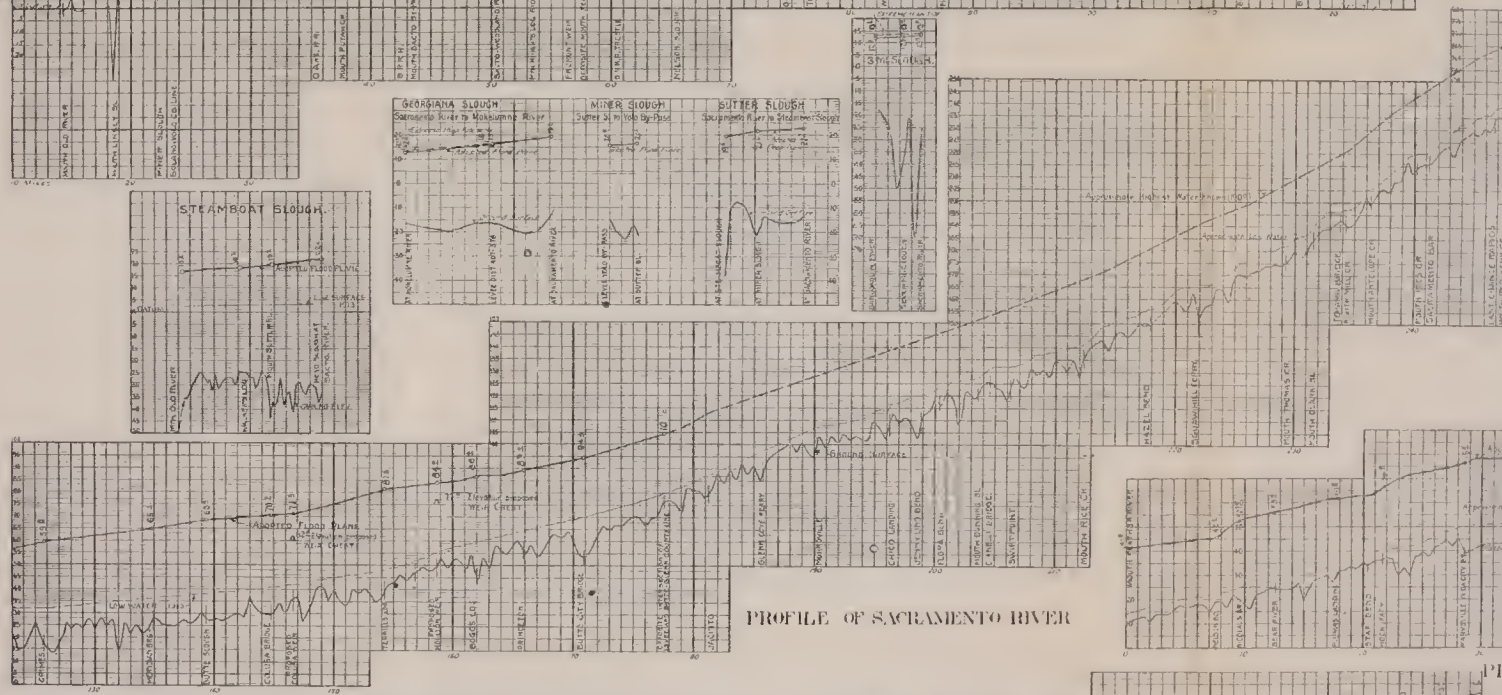
PROFILE OF YOLO, SUTTER, & BUTTE BY-PASSES & BUTTE BASIN



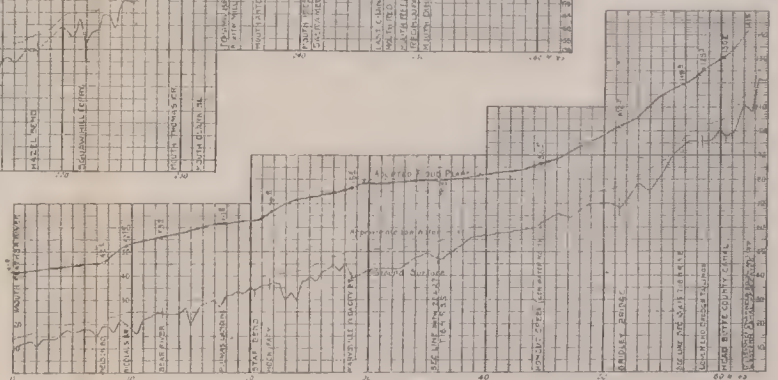




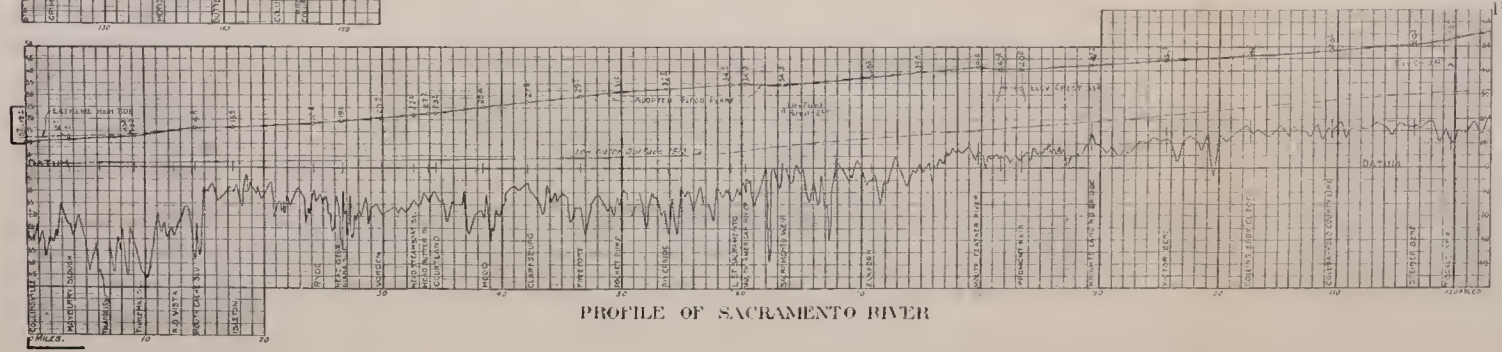




PROFILE OF SACRAMENTO RIVER



PROFILE OF FEATHER RIVER.



PROFILE OF SACRAMENTO RIVER

SACRAMENTO RIVER, CALIFORNIA.
REVISION OF FLOOD CONTROL PROJECT
SHOWING PROFILES

U.S. ENGINEER OFFICE 2nd S. F. DIST SAN FRANCISCO CAL

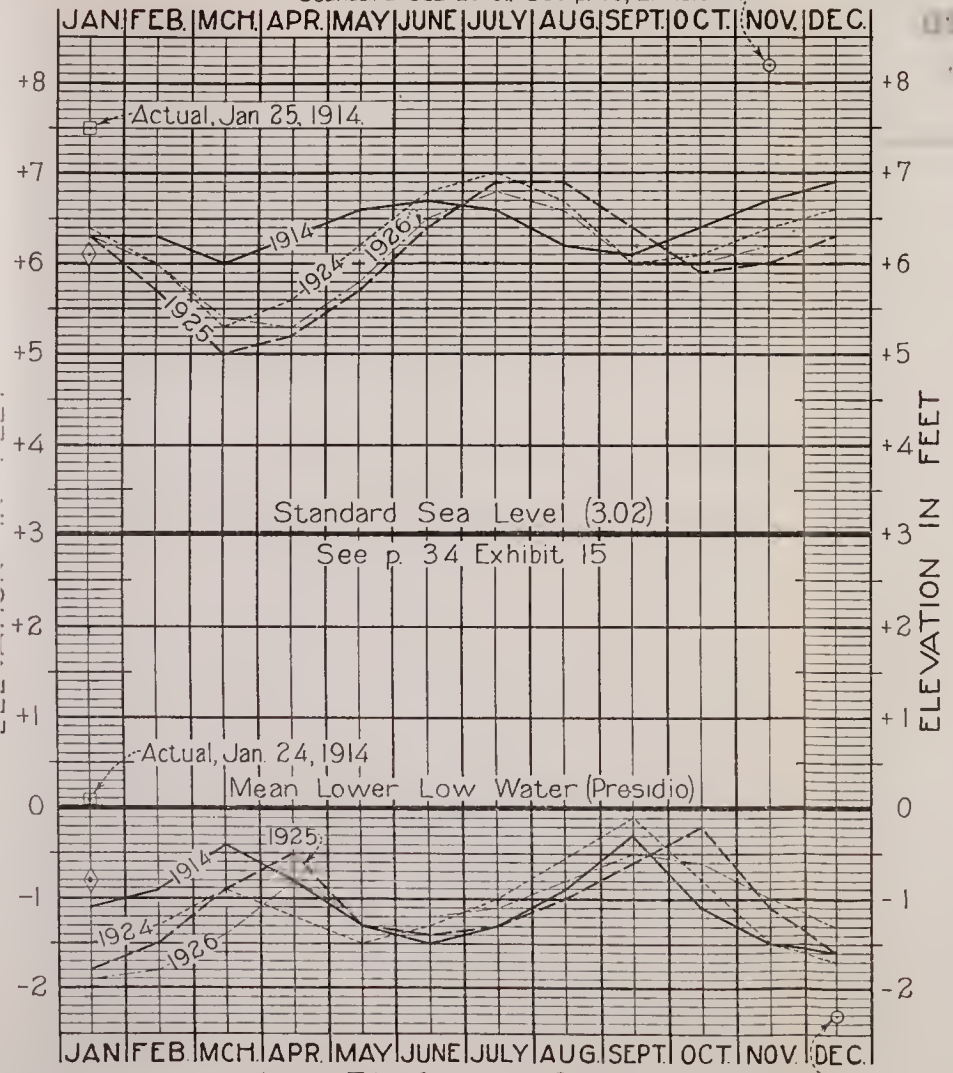
FILE NO. 50-25-785
SV-144

193-D-97

Plate 5-22

MAXIMUM AND MINIMUM PREDICTED TIDES AT PRESIDIO FOR 1914, 1924, 1925 AND 1926

Highest Tide of record at Presidio due to Storm on Ocean, occured on Nov. 18, 1918. Height 5.2 Ft. above Standard Sea Level. See p. 19, Exhibit 15.



Lowest Tide of record at Presidio due to Storm occured on Dec. 25, 1912 and Dec 9, 1923. Height -5.3 Ft. below Standard Sea Level. See p 19, Exhibit 15

NOTES:-

The Points of the Curves show the Maximum Tide for the Month and the corresponding Minimum as indicated in the Tide Tables. for Presidio, California. In practically all cases the Minimum occured with the Maximum but if not, the Minimum was only 0.1 or 0.2 lower than shown. It should not be inferred from the position of the Points on the Curves that the Maximum or Minimum Tides occurred on the 15th of each Month.

Latest Standard Sea Level is at Elevation 2.97 above Mean Lower Low Water.

EXPLANATION:-

——————— Year 1914.
- - - - - - - - - " 1924
— — — — — — — " 1925.
— · — · — · — · — " 1926

⊡ Points show Maximum and corresponding Minimum Tide which occured during the Storm of Jan. 19, 1914 as taken from Plate 5-14.

◇ Points show the corresponding predicted Heights.

APPROVED FOR ESTIMATING PURPOSES.

R. F. Walter
CHIEF ENGINEER

DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS

SALT WATER BARRIER

MAXIMUM AND MINIMUM PREDICTED TIDES AT PRESIDIO FOR 1914-24-25 AND 26

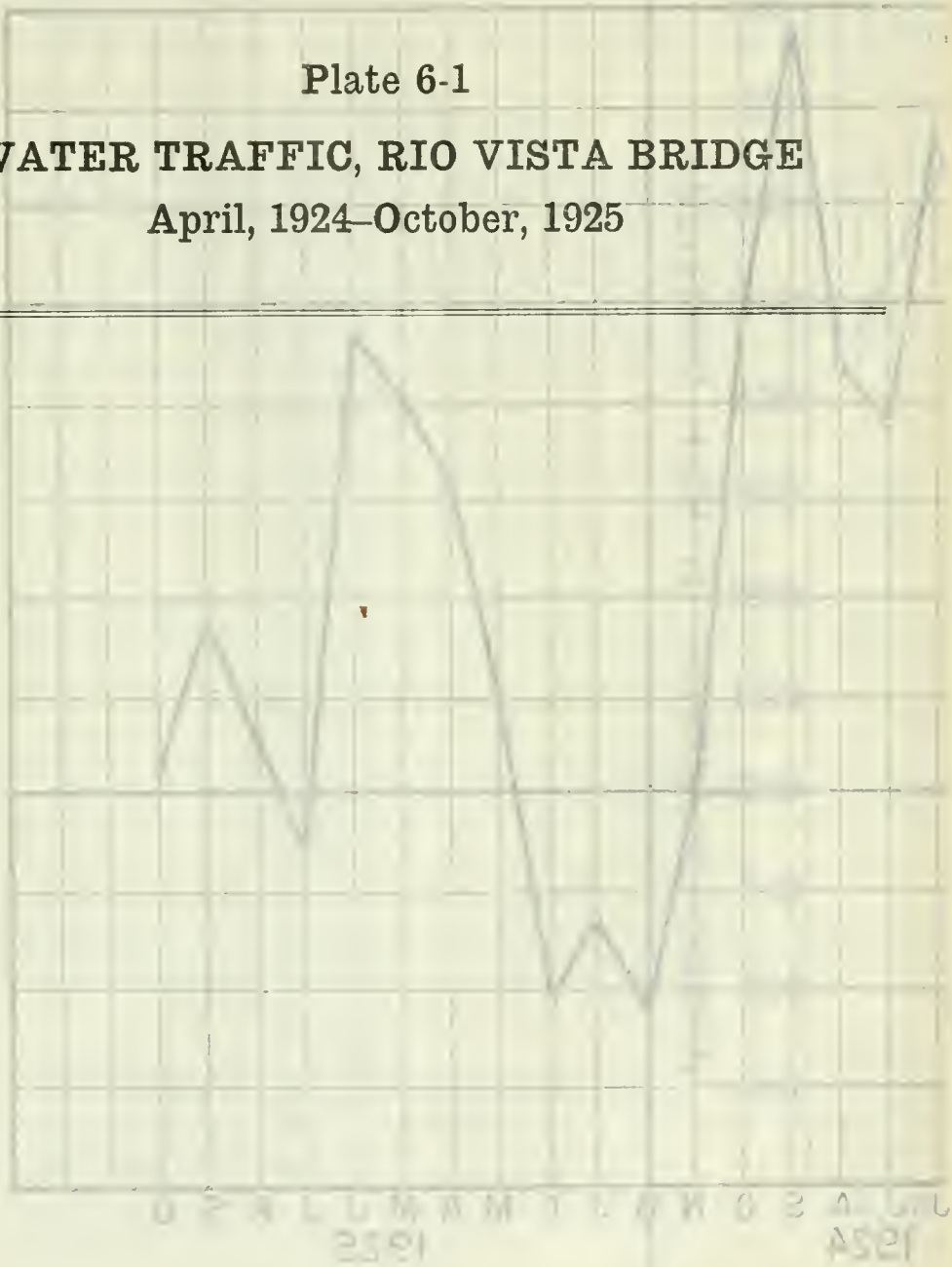
Drawn: WRY-CAM Submitted: W. F. Kemp
Checked: _____ Approved: J. L. Savage

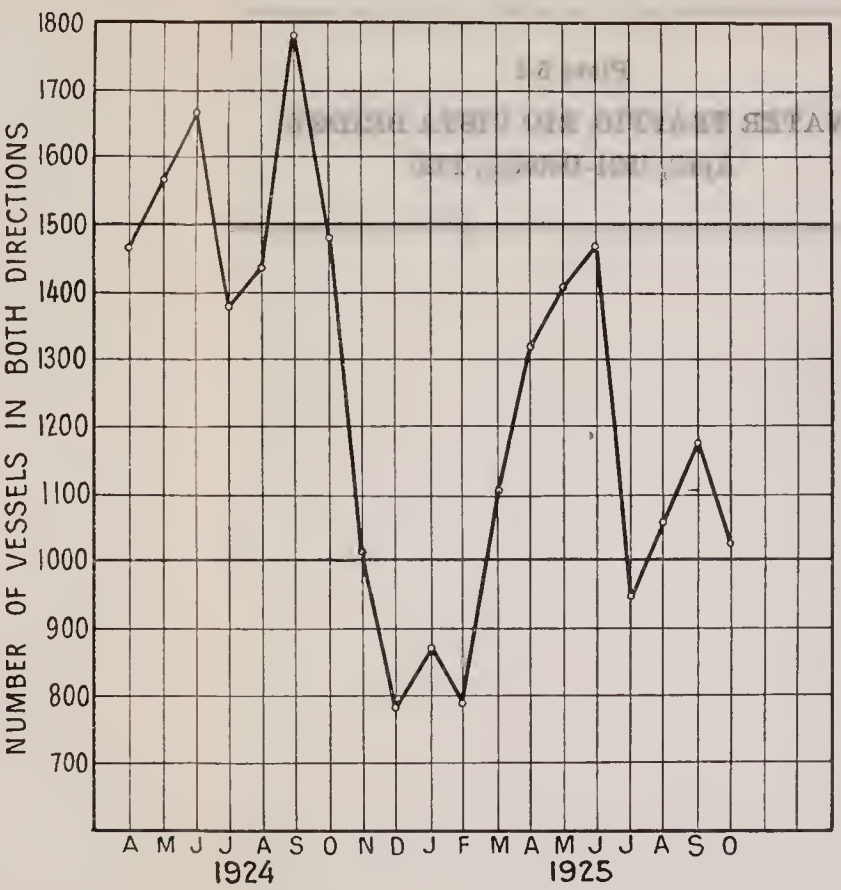
SV-155 Ellensburg, Wash Feb 1927. 193-D-98

Plate 6-1

WATER TRAFFIC, RIO VISTA BRIDGE

April, 1924–October, 1925





Figures include only vessels which required operation of lift bridge.

Traffic on San Joaquin River does not pass this point and some Sacramento River traffic reaches points above bridge via Three Mile Slough and Seven Mile Slough.

Total Vessels in 1923 13,798

Total Vessels from July 1924 to June 1925, inclusive 14,830

DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS, CALIF.
SALT WATER BARRIER

WATER TRAFFIC-RIO VISTA BRIDGE
APRIL 1924 — OCTOBER 1925

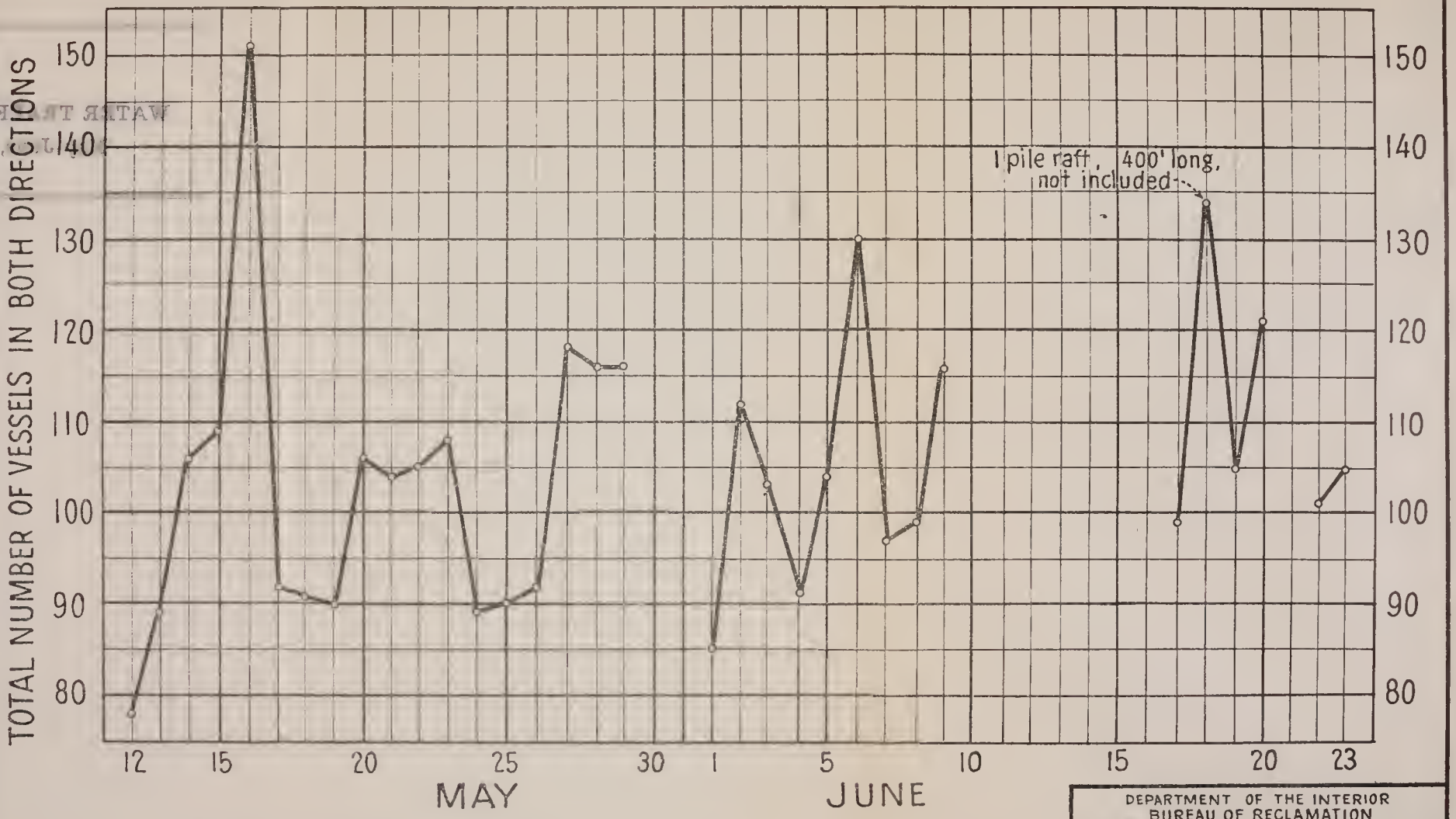
DRAWN N.B.H., M.C. SUBMITTED W.W. Young
CHECKED N.C.H. APPROVED R.P. Walsh

SV-64 | BERKELEY, CALIF., 11-3-25 | 193-D-113

Plate 6-2

WATER TRAFFIC, SAN PABLO STRAIT

May–June, 1925 (Discontinuous)



Minimum Number per day 78
Maximum " " " 151
Average " " " 105
Ratio Maximum to Average 1.44

DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS - CALIF.
SALT WATER BARRIER
WATER TRAFFIC - SAN PABLO STRAIT
MAY - JUNE, 1925

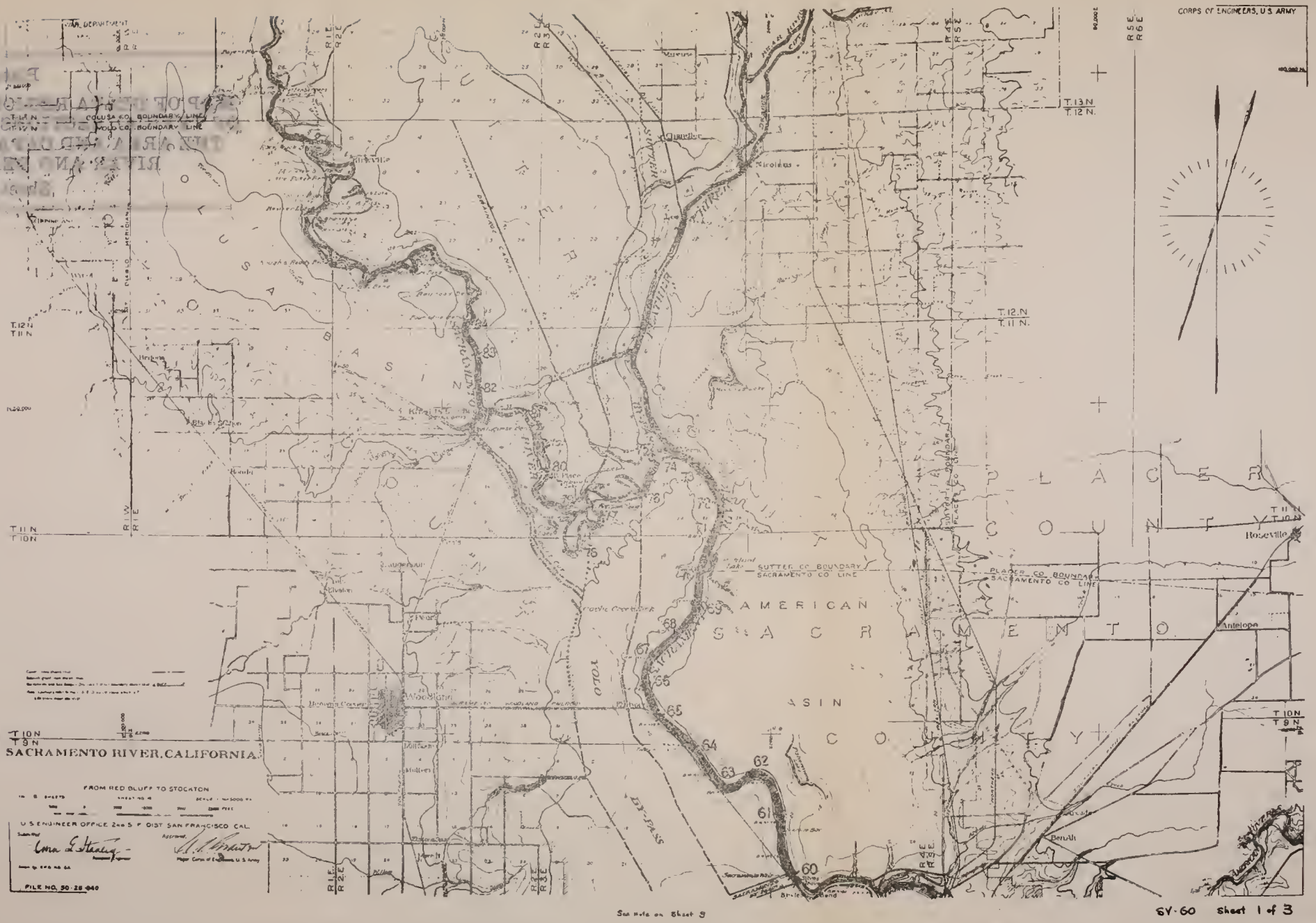
DRAWN: N.B.H., McC. SUBMITTED W.K. Young
CHECKED N.B.H. APPROVED R.P. Walter

SV-63 | BERKELEY, CALIF., 11-3-25 | 193-D-112

Plate 7-1

MAP OF DELTA REGION SHOWING LOCATION OF TYPICAL SECTIONS USED IN ESTIMATING THE AREA AND CAPACITY OF THE LOWER RIVER AND DELTA CHANNELS

Sheet 1 of 3

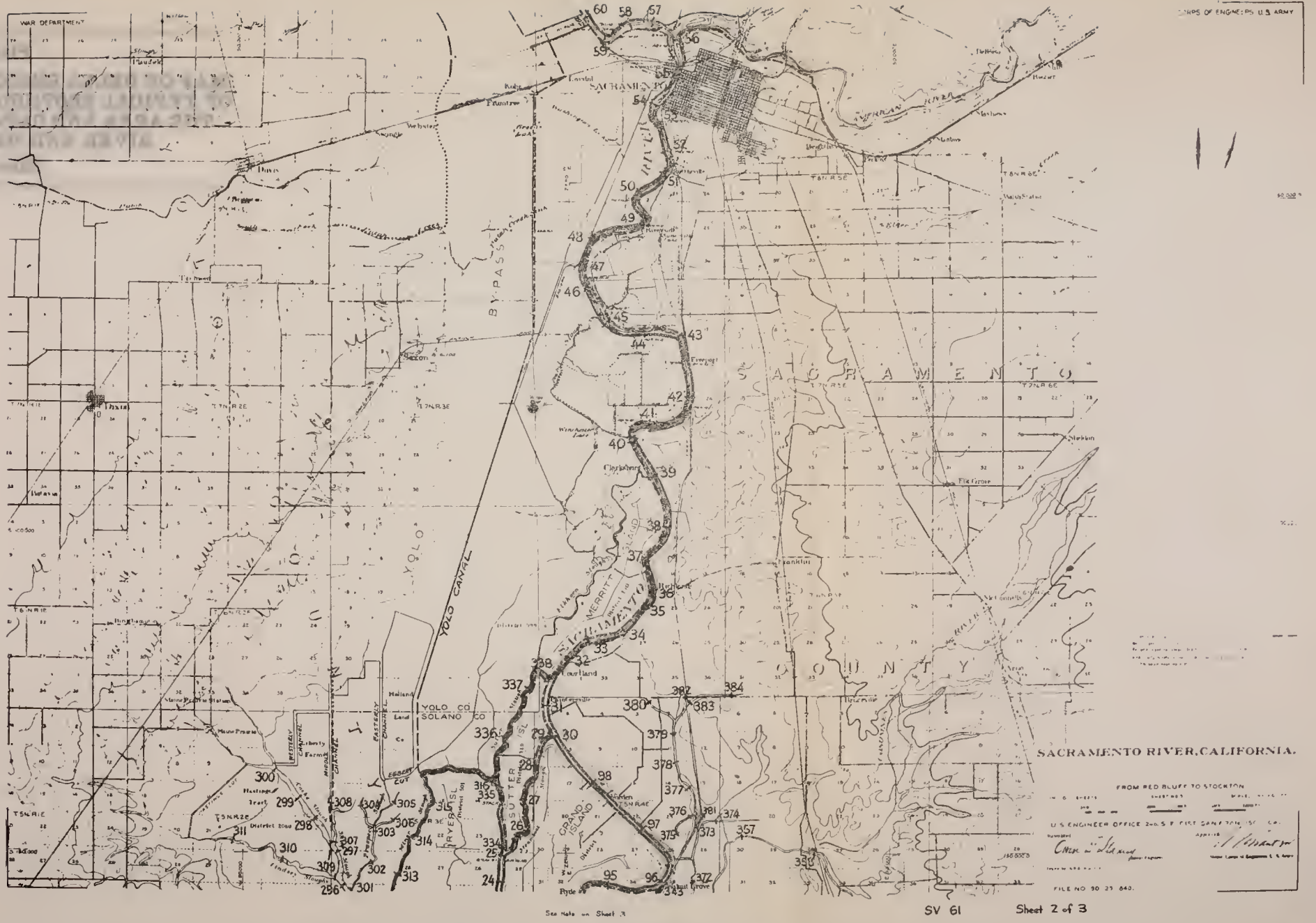


Map of Delta Region showing location of typical sections used in estimating the area and capacity of the lower river and delta channels

Plate 7-2

MAP OF DELTA REGION SHOWING LOCATION OF TYPICAL SECTIONS USED IN ESTIMATING THE AREA AND CAPACITY OF THE LOWER RIVER AND DELTA CHANNELS

Sheet 2 of 3



Map of the Delta Region showing location of typical sections used in estimating the area and capacity of the lower river and delta channels

Plate 7-3

MAP OF DELTA REGION SHOWING LOCATION OF TYPICAL SECTIONS USED IN ESTIMATING THE AREA AND CAPACITY OF THE LOWER RIVER AND DELTA CHANNELS

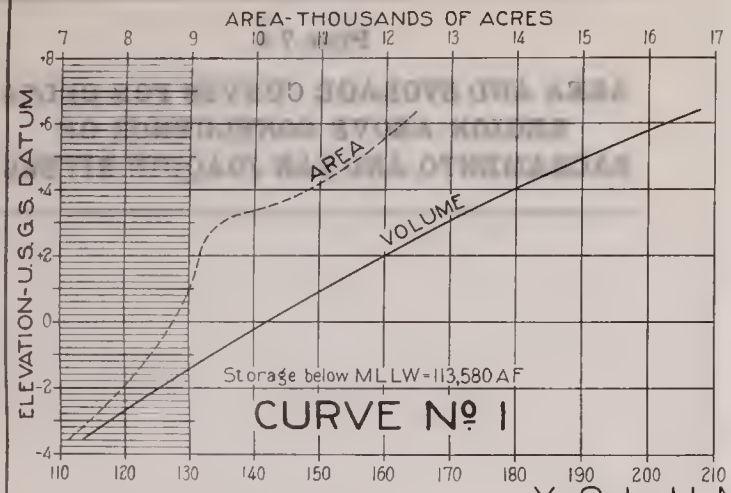
Sheet 3 of 3

NOTE
Numbering indicates points at which the cross sectional area of the channel was determined from records of soundings on file in the 2nd District Engineers Office San Francisco, that were used by the Bureau of Reclamation in estimating the approximate capacity of the Delta Channels in connection with the proposed Salt Water Barrier.
SACRAMENTO RIVER, CALIFORNIA.
SAN JOAQUIN
SACRAMENTO
MOKELUMNE
MONTEZUMA
SUISUN
GRANT LINE CANAL
OLD RIVER
MIDDLE RIVER
TRACT
ISLAND

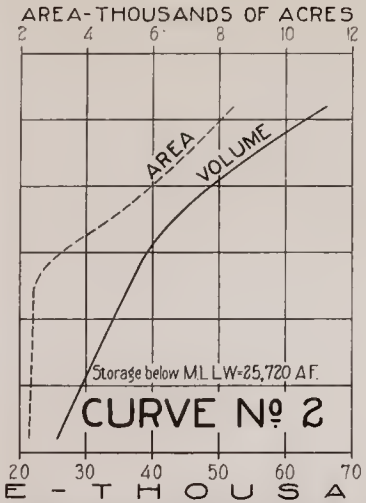
Map of the Delta Region showing location of typical sections used in estimating the area and capacity of lower river and delta channels

Plate 7-4

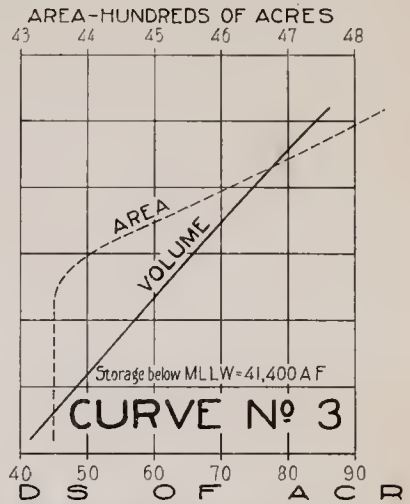
AREA AND STORAGE CURVES FOR DELTA REGION ABOVE CONFLUENCE OF SACRAMENTO AND SAN JOAQUIN RIVERS



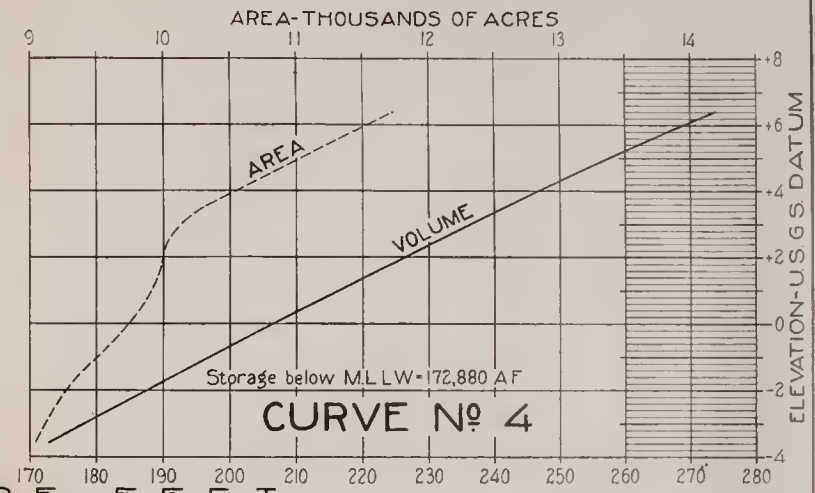
AREA AND STORAGE IN SACRAMENTO RIVER ABOVE CONFLUENCE WITH SAN JOAQUIN RIVER



AREA AND STORAGE WEST OF SACRAMENTO RIVER

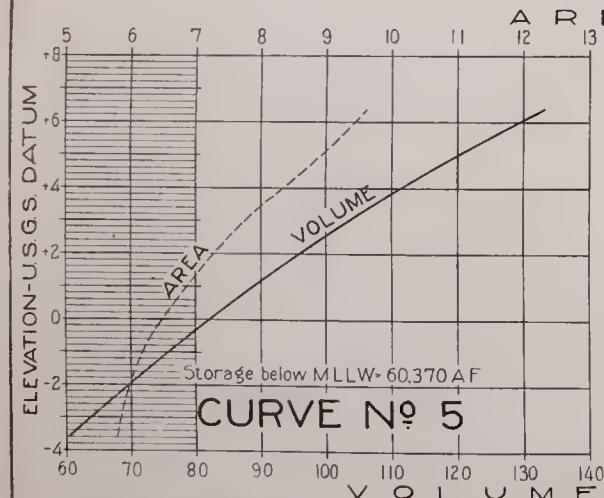


AREA AND STORAGE IN DELTA CHANNELS BETWEEN SACRAMENTO AND SAN JOAQUIN RIVERS



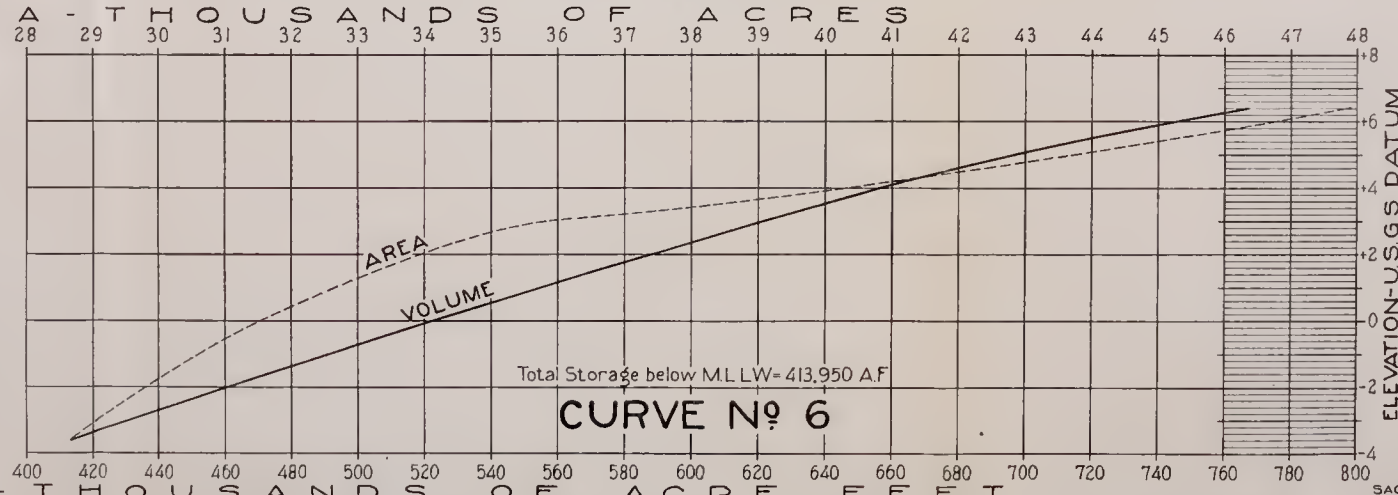
AREA AND STORAGE IN SAN JOAQUIN RIVER ABOVE CONFLUENCE WITH SACRAMENTO RIVER

VOLUME - THOUSANDS OF ACRE FEET



AREA AND STORAGE IN DELTA CHANNELS SOUTH OF SAN JOAQUIN RIVER

AREA - THOUSANDS OF ACRES



AREA AND STORAGE IN DELTA REGION ABOVE CONFLUENCE OF SAN JOAQUIN AND SACRAMENTO RIVERS

Notes:-

M.L.L.W. on Curves refers to Mean Lower Low Water at the Confluence of the Rivers, which is -3.6 Feet U.S.G.S. Datum and is 0.0 U.S.E. Datum

Volumes are computed using End Areas. Area Curves were developed from the Volume Curves by taking average Area for each Foot of Depth

APPROVED FOR ESTIMATING PURPOSES:-

A. P. Walter
CHIEF ENGINEER

DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS

SALT WATER BARRIER

AREA AND STORAGE CURVES

FOR

DELTA REGION ABOVE CONFLUENCE OF SACRAMENTO AND SAN JOAQUIN RIVERS

Drawn-PAJ-CAM Submitted W. H. Jerry
Checked-___ ___ Approved- J. B. Savage

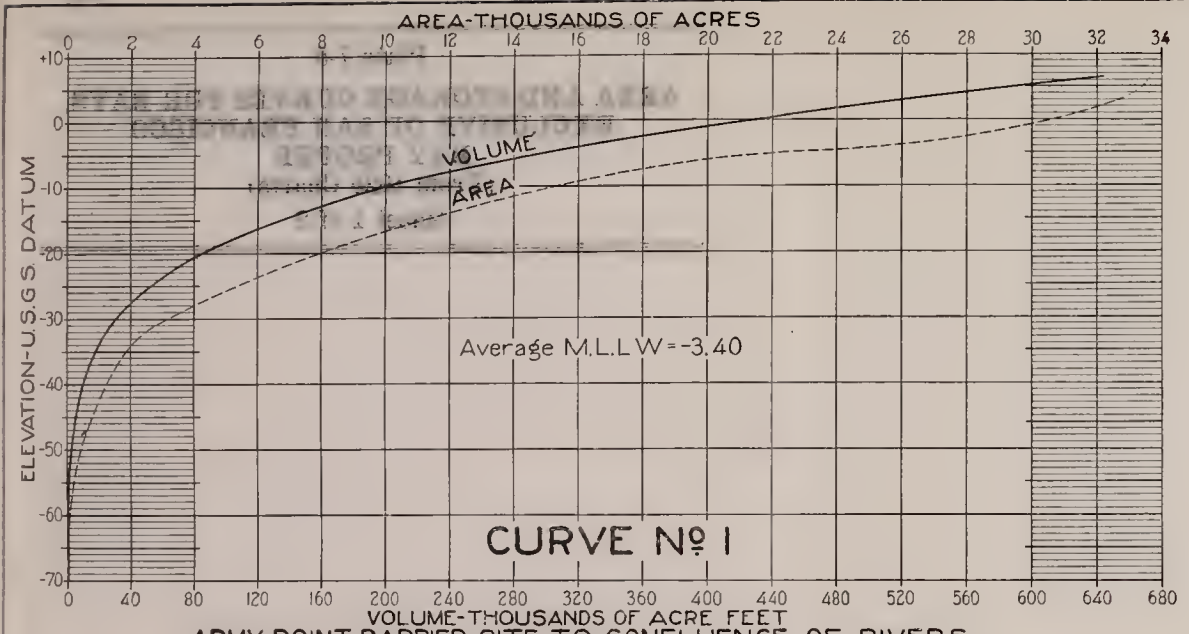
SV-156 Berkeley, California Mch 1935 193-D-104

Plate 7-5

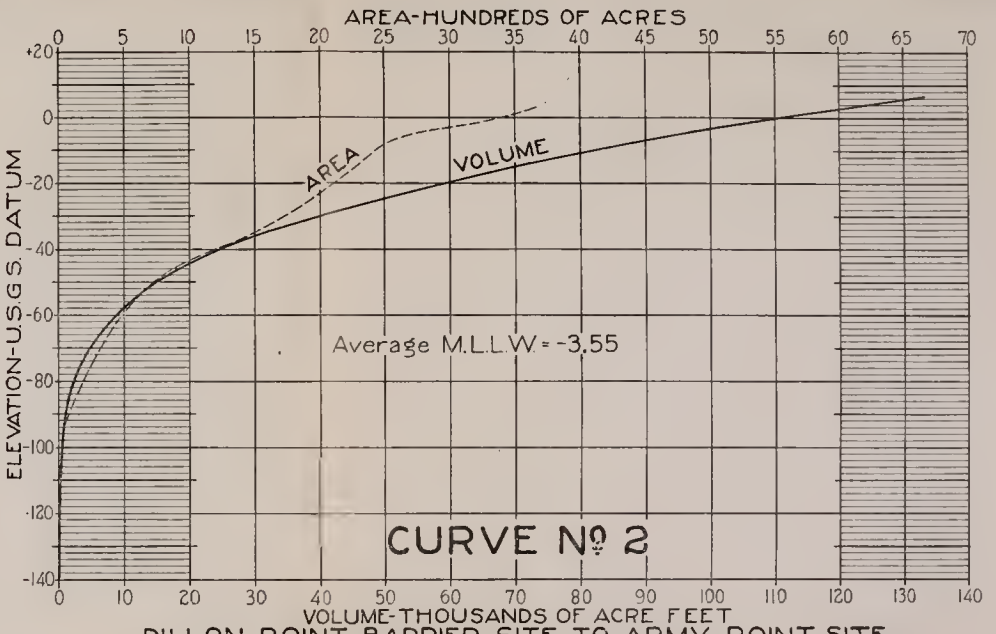
AREA AND STORAGE CURVES FOR BAYS, EXCLUSIVE OF SAN FRANCISCO BAY PROPER

(From 1925 Charts)

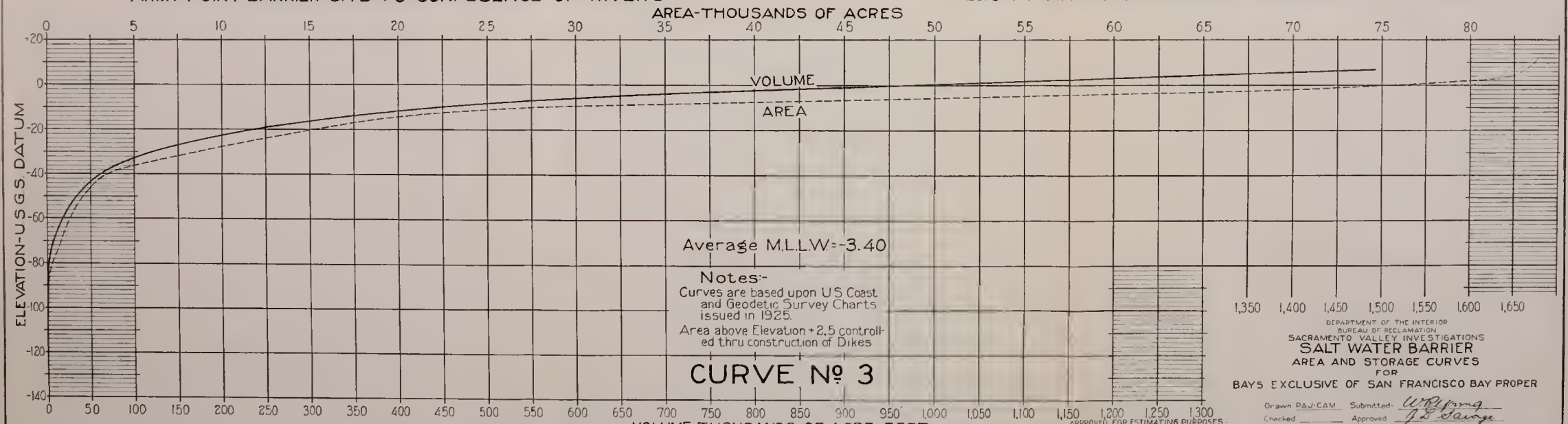
Sheet 1 of 2



ARMY POINT BARRIER SITE TO CONFLUENCE OF RIVERS


AREA-HUNDREDS OF ACRES
0 5 10 15 20 25 30 35 40 45 50 55 60 65 70
+20 0 -20 -40 -60 -80 -100 -120 -140
ELEVATION-U.S.G.S. DATUM
AREA
VOLUME
Average M.L.L.W.=-3.55
CURVE Nº 2
0 10 20 30 40 50 60 70 80 90 100 110 120 130 140
VOLUME-THOUSANDS OF ACRE FEET

DILLON POINT BARRIER SITE TO ARMY POINT SITE


AREA-THOUSANDS OF ACRES
0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80
+20 0 -20 -40 -60 -80 -100 -120 -140
ELEVATION-U.S.G.S. DATUM
VOLUME
AREA
Average M.L.L.W.=-3.40
Notes:-
Curves are based upon U.S. Coast and Geodetic Survey Charts issued in 1925.
Area above Elevation +2.5 controlled thru construction of Dikes
CURVE Nº 3
0 50 100 150 200 250 300 350 400 450 500 550 600 650 700 750 800 850 900 950 1,000 1,050 1,100 1,150 1,200 1,250 1,300 1,350 1,400 1,450 1,500 1,550 1,600 1,650
VOLUME-THOUSANDS OF ACRE FEET

POINT SAN PABLO BARRIER SITE TO DILLON POINT SITE

APPROVED FOR ESTIMATING PURPOSES
R. P. Walter
CHIEF ENGINEER

DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS

SALT WATER BARRIER
AREA AND STORAGE CURVES FOR BAYS EXCLUSIVE OF SAN FRANCISCO BAY PROPER

Drawn PAJ-CAM Submitted: W.P. Young
Checked _____ Approved: J.L. Savage

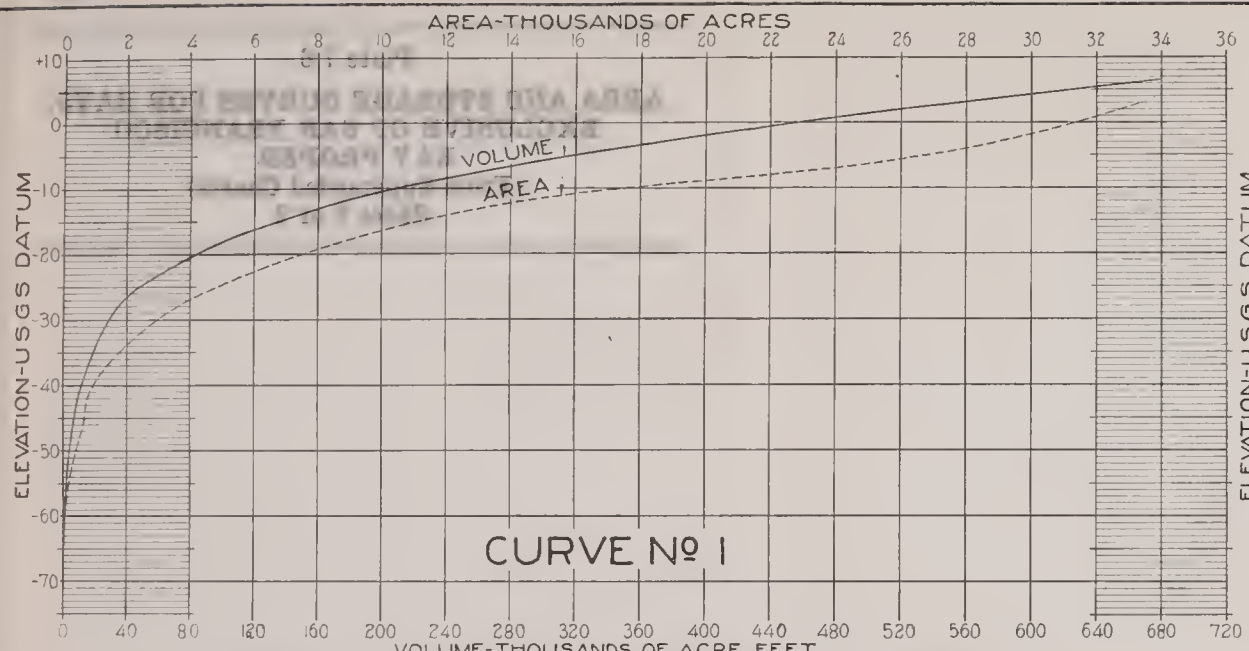
SV-157 Berkeley, California March 1925 Sheet 1 of 2 193-D-105

Plate 7-6

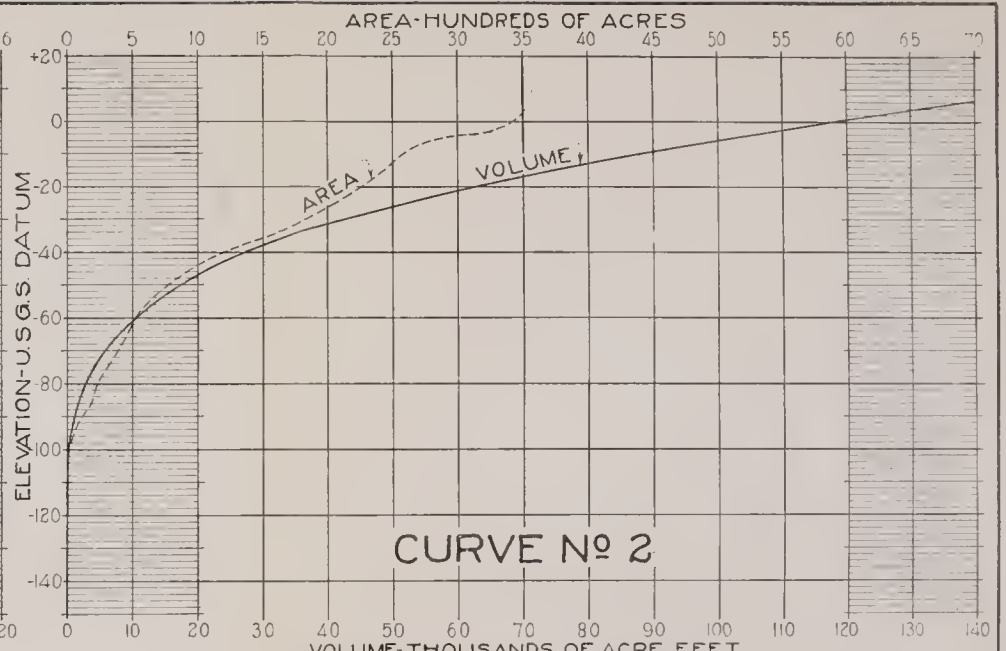
AREA AND STORAGE CURVES FOR BAYS, EXCLUSIVE OF SAN FRANCISCO BAY PROPER

(From Superseded Charts)

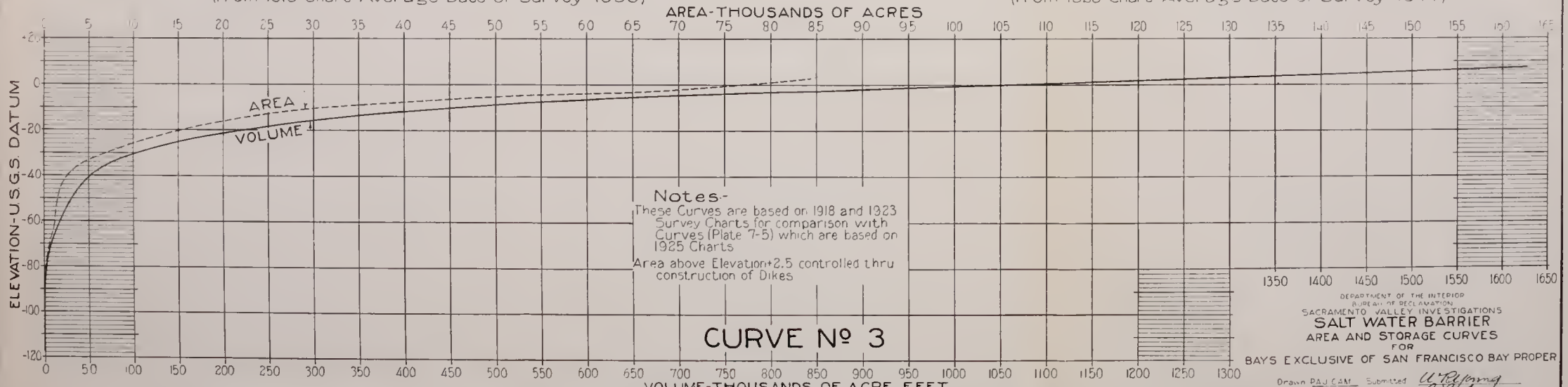
Sheet 2 of 2



ARMY POINT BARRIER SITE TO CONFLUENCE OF RIVERS
(From 1918 Chart-Average Date of Survey 1895)



DILLON POINT BARRIER SITE TO ARMY POINT SITE
(From 1923 Chart-Average Date of Survey-1877)



POINT SAN PABLO BARRIER SITE TO DILLON POINT SITE
(From 1923 Chart-Average Date of Survey 1896)

Notes-
These Curves are based on 1918 and 1923 Survey Charts for comparison with Curves (Plate 7-5) which are based on 1925 Charts

Area above Elevation+2.5 controlled thru construction of Dikes

DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS
SALT WATER BARRIER
AREA AND STORAGE CURVES
FOR
BAYS EXCLUSIVE OF SAN FRANCISCO BAY PROPER

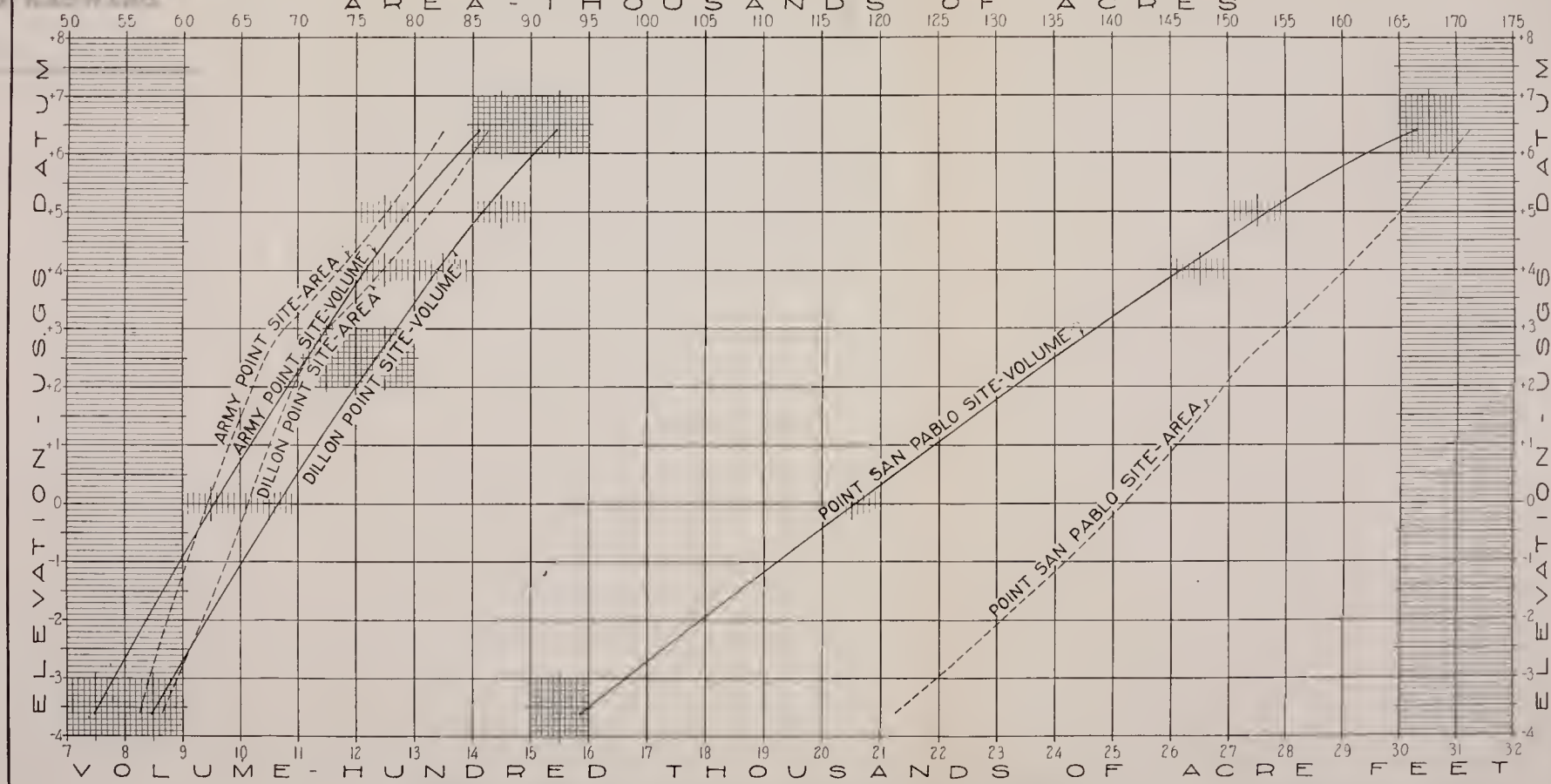
APPROVED FOR ESTIMATING PURPOSES
A. P. Walter
CHIEF ENGINEER

Drawn PAU CAM Submitted W. P. Fleming
Checked _____ Approved G. L. Savage

SV-158 Berkeley California March 1925 Sheet 2 of 2 193-D-106

Plate 7-7

AREA AND STORAGE ABOVE BARRIER SITES BETWEEN ELEVATION —3.6 and +6.4 U. S. G. S.


AREA - THOUSANDS OF ACRES
50 55 60 65 70 75 80 85 90 95 100 105 110 115 120 125 130 135 140 145 150 155 160 165 170 175
ELEVATION - USGS DATUM
+8 +7 +6 +5 +4 +3 +2 +1 0 -1 -2 -3 -4
ARMY POINT SITE-AREA
ARMY POINT SITE-VOLUME
DILLON POINT SITE-AREA
DILLON POINT SITE-VOLUME
POINT SAN PABLO SITE-VOLUME
POINT SAN PABLO SITE-AREA
7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32
VOLUME - HUNDRED THOUSANDS OF ACRE FEET

AREA AND STORAGE ABOVE SITES INVESTIGATED
(Elevation -3.6 to Elevation +6.4)

Notes:-
The Curves include the Bays
Rivers and Delta Channels

APPROVED FOR ESTIMATING PURPOSES
A. P. Walter
CHIEF ENGINEER

DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS
SALT WATER BARRIER
AREA AND STORAGE ABOVE BARRIER SITES
ELEVATION -3.6 TO ELEVATION +6.4
Drawn P.A.J-C.A.M Submitted W.W.Fleming
Checked _____ Approved J.L. Savage
SV-159 Berkeley, California Mch 1925 193-D-107

Plate 8-1

PLAN AND SECTIONS OF GOLDEN GATE BAR

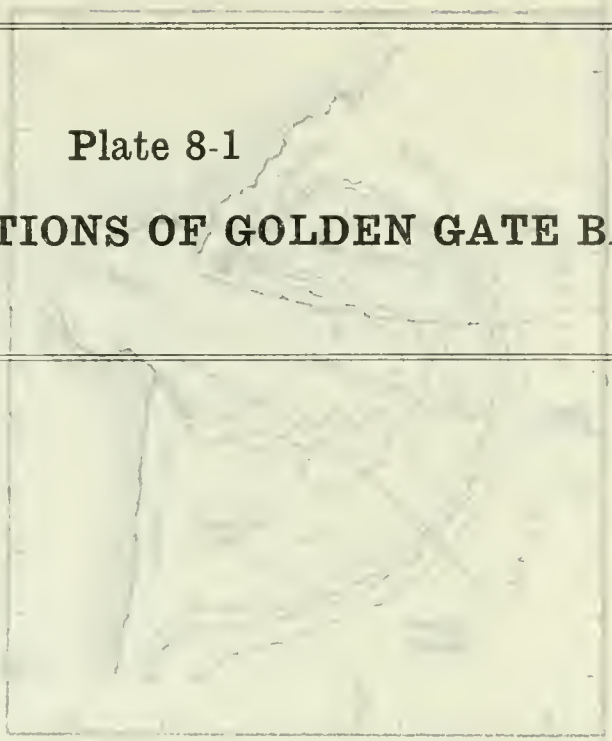


Figure Nº 1

Plan of the Golden Gate bar, showing the divisions referred to in the text. All contours are in fathoms based on the surveys by the United States Coast and Geodetic Survey and U.S Engineer Department in 1900 & 1921.

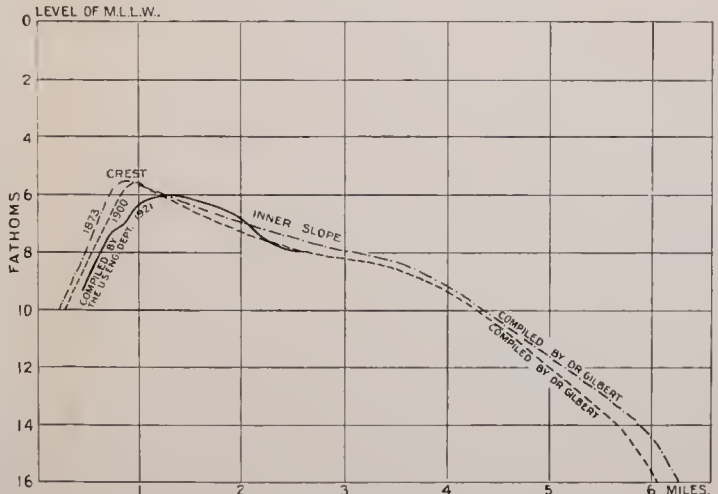


Figure Nº 2

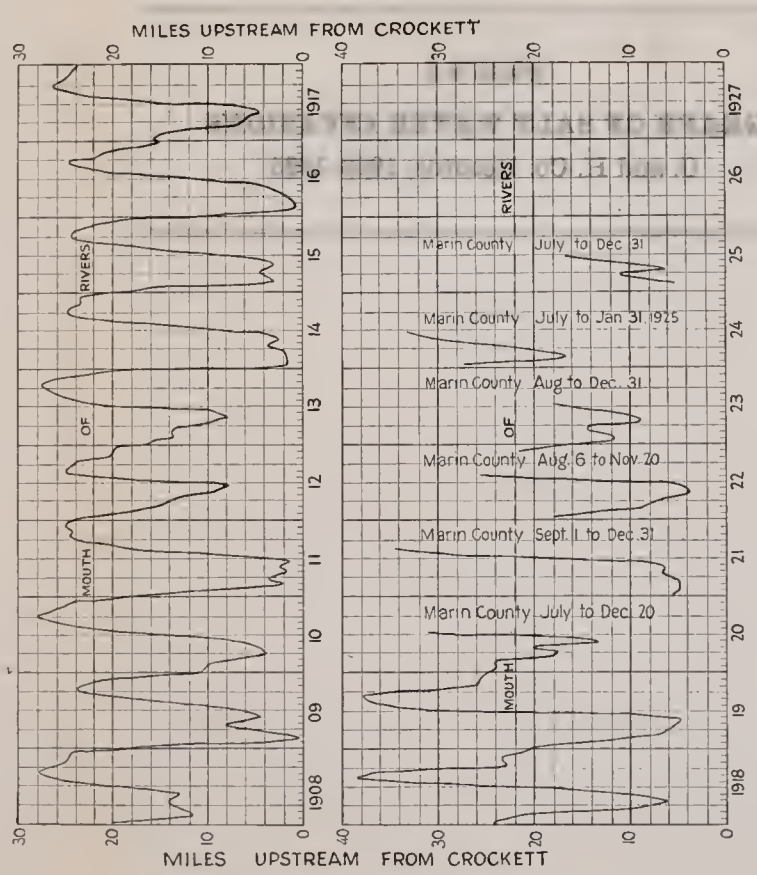
Generalized cross profiles of the Golden Gate bar in its middle division

Plan and Sections of Golden Gate Bar

Plate 9-1

GRAPH OF SALT WATER INVASIONS

C. and H. Co. Records, 1908–1925



Average distance above Crockett traveled each month by barges of the California & Hawaiian Sugar Refining Corporation to obtain water suitable for use at their Refinery

APPROVED FOR ESTIMATING PURPOSES.
A P Davis
CHIEF ENGINEER

DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS
SALT WATER BARRIER
GRAPH OF SALT WATER INVASIONS
from C & H Co. Records; 1908-1925

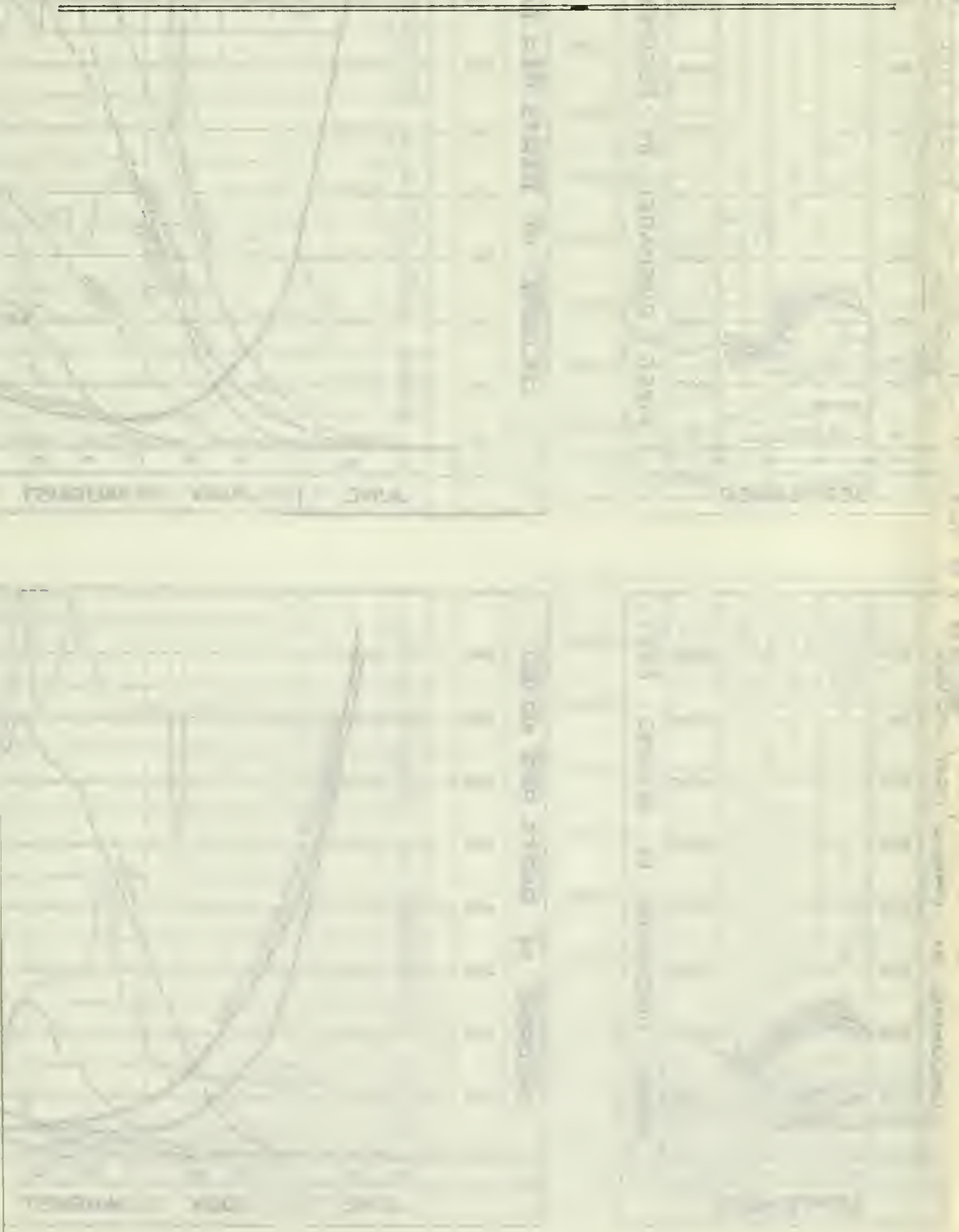
Drawn W.R.Y.—M. Submitted W.R.Young
Checked ____ Approved J.L. Savage

SV-161 Ellensburg Wash. July 1927 193-D-109

Plate 9-2

RELATION OF SALINITY IN SACRAMENTO-SAN JOAQUIN DELTA TO RIVER DISCHARGE

Stafford Report, 1924



RELATION OF SALINITY IN THE SACRAMENTO-SAN JOAQUIN DELTA TO RIVER DISCHARGE

NOTE SALINITY CURVES INDICATE MAXIMUM SALINITY DURING DAYLIGHT HOURS

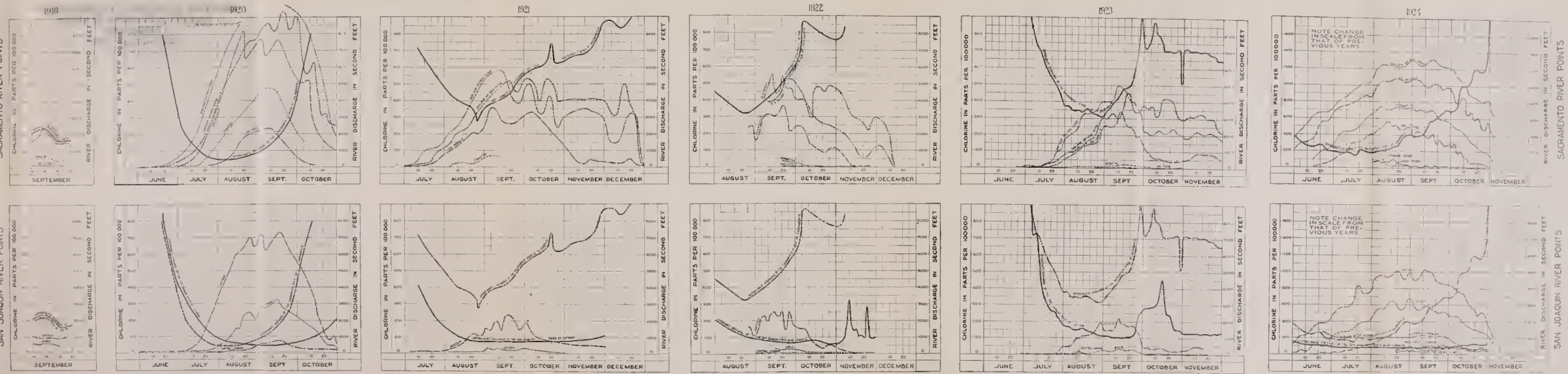
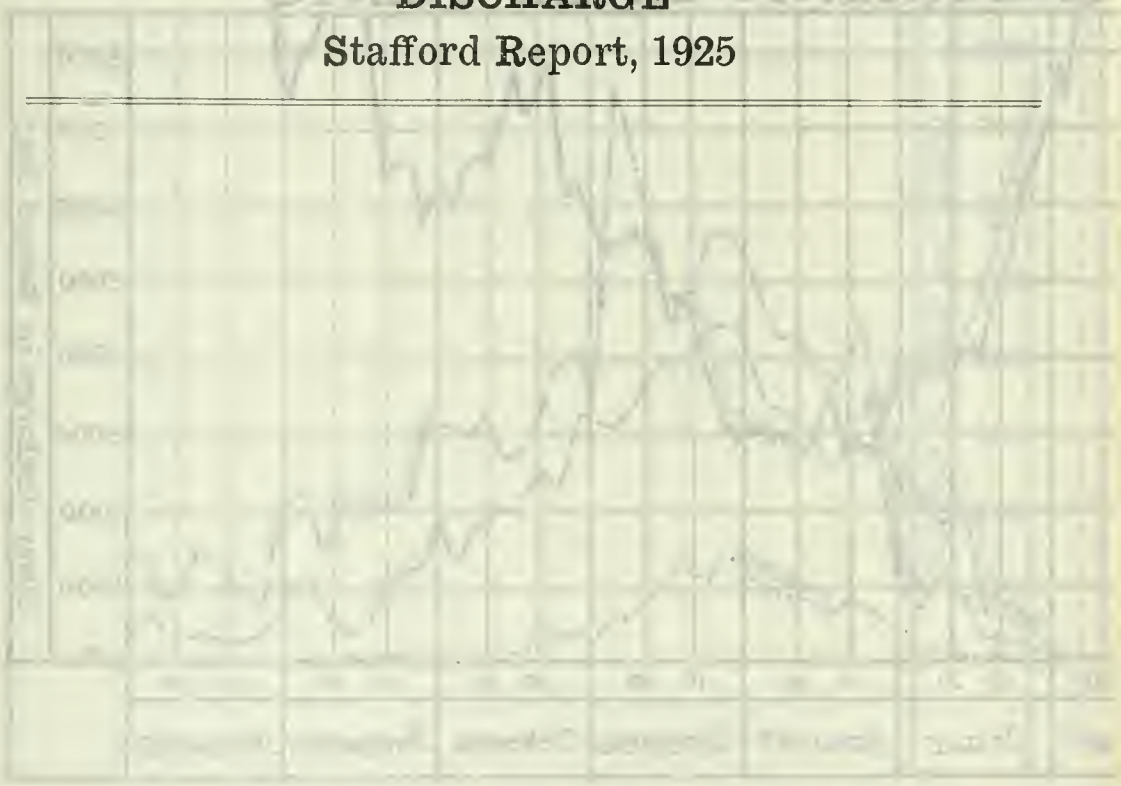
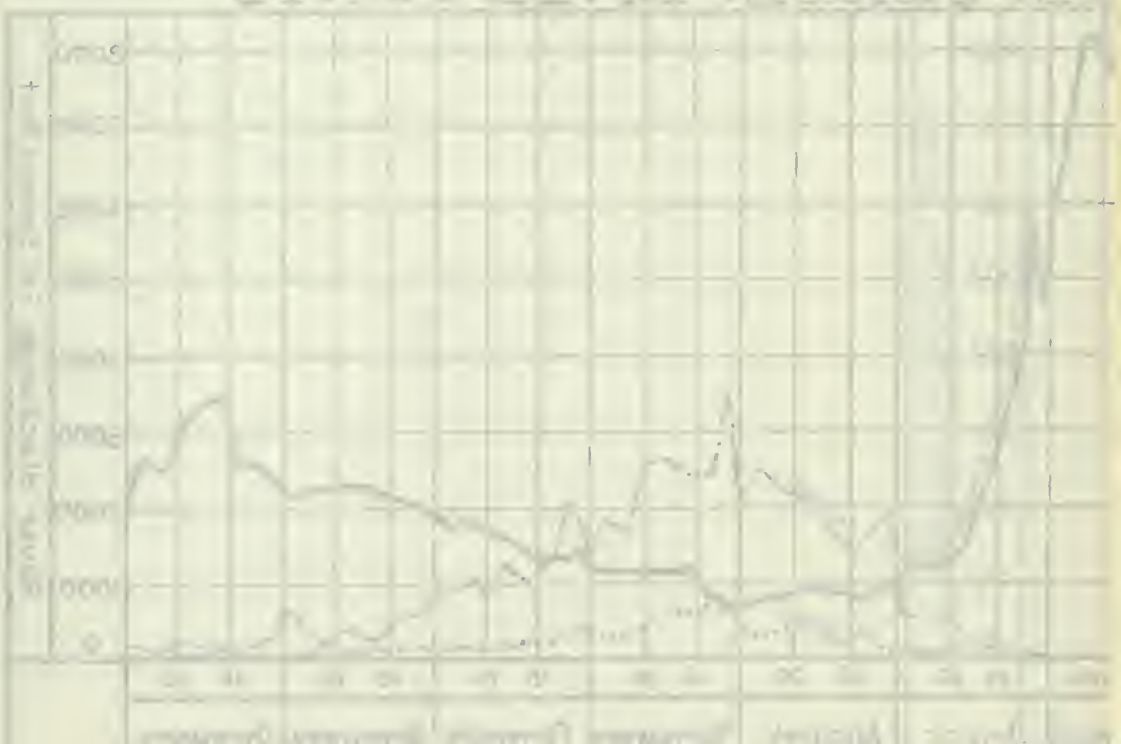


Plate 9-3

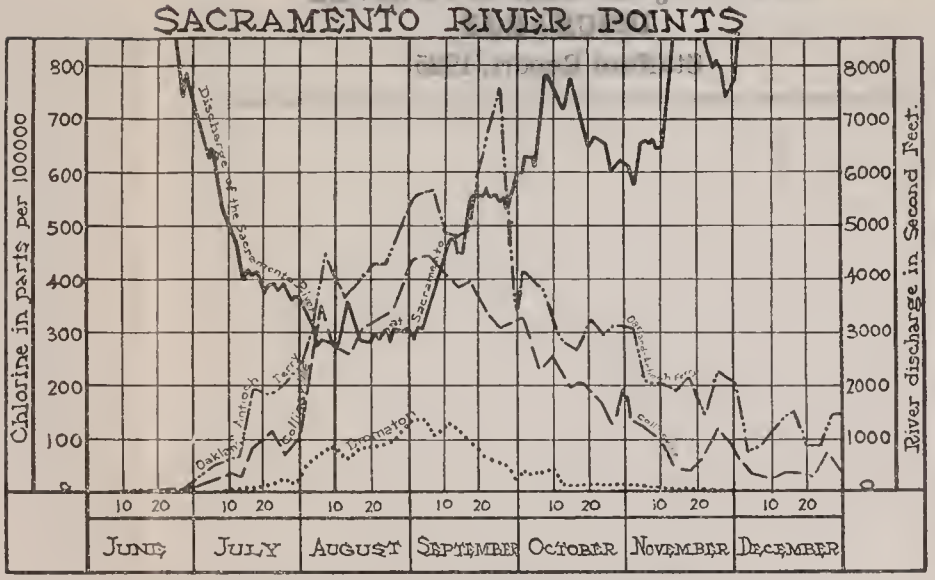
RELATION OF SALINITY IN SACRAMENTO-SAN JOAQUIN DELTA TO RIVER DISCHARGE

Stafford Report, 1925





Relation of Salinity in the Sacramento-San Joaquin Delta to River Discharge 1925.



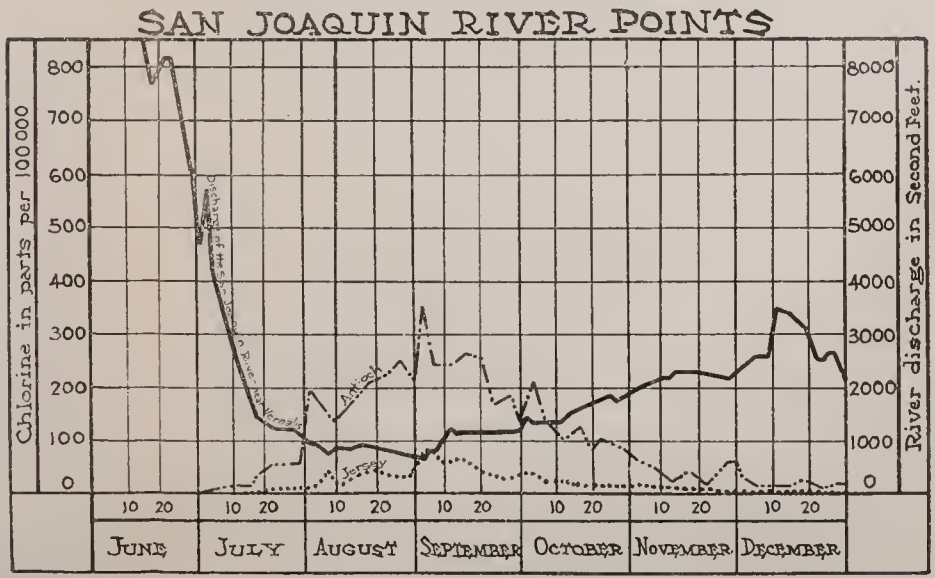
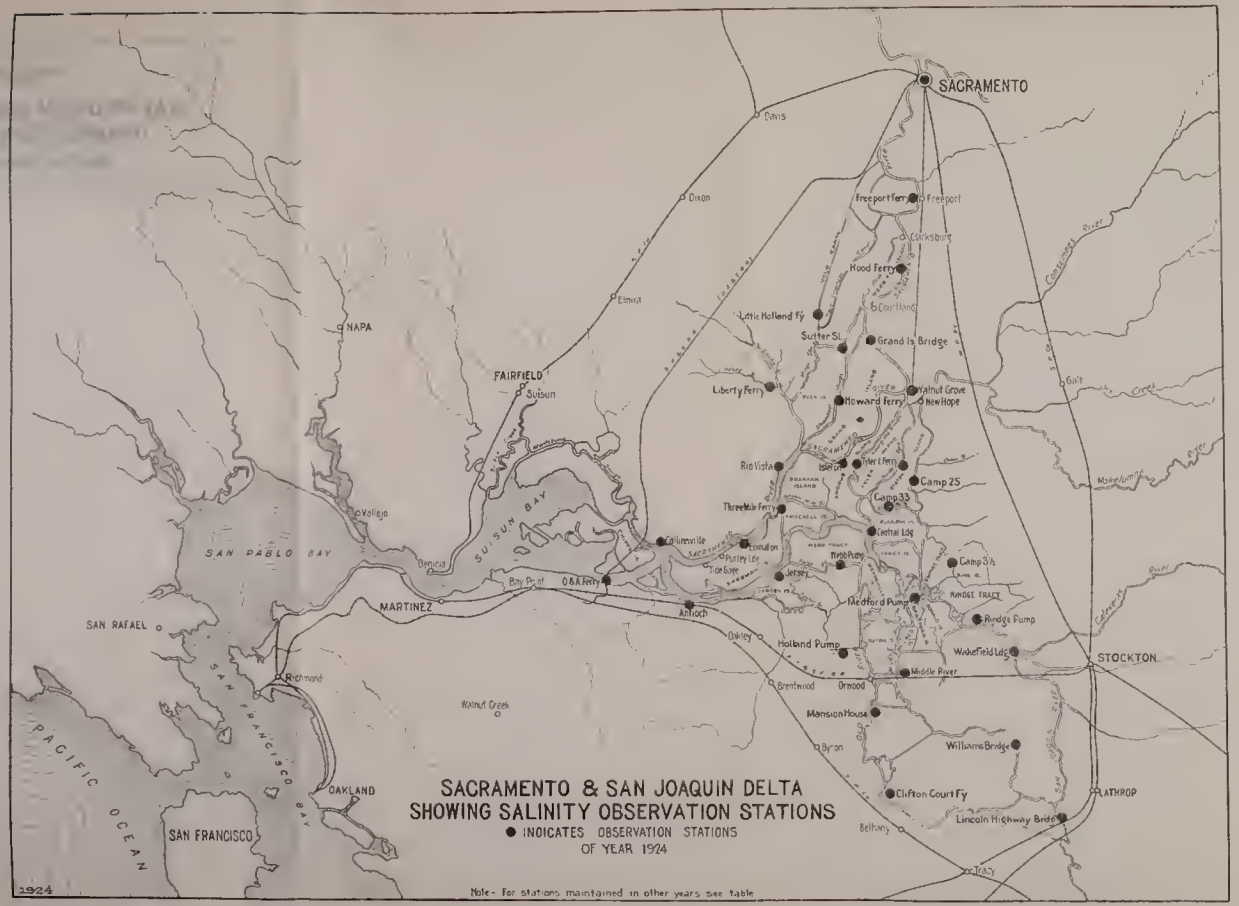


Plate 9-4

MAP OF DELTA SHOWING SALINITY OBSERVATION STATIONS

Stafford Report, 1924



SALINITY OBSERVATION STATIONS MAINTAINED BY DIVISION OF WATER RIGHTS, 1919 TO 1923, INCLUSIVE, AND BY SACRAMENTO-SAN JOAQUIN WATER SUPERVISOR, 1924

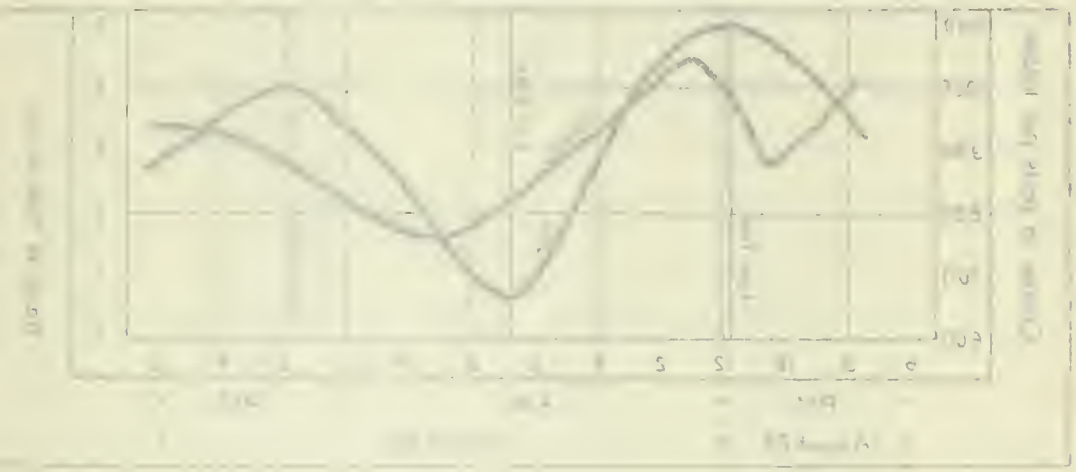
Station	Periods under observation					
	1919	1920	1921	1922	1923	1924
Antioch	Sept. 14–Sept. 19	June 3–Nov. 22	July 5–Nov. 28	Aug. 26–Nov. 28	June 28–Nov. 16	May 24– *
Blylock Landing on Bradford Island	Sept. 13–Sept. 19					
Camp 11						July 22– *
Camp 24		Sept. 18–Oct. 19				
Camp 25						July 30– *
Camp 33						July 22– *
Camp 35		Aug. 26–				
Central Landing	Sept. 13–Sept. 15	July 22–Nov. 11		Sept. 2–Nov. 16	June 28–Aug. 22	June 22– *
Clifton Court Ferry						Aug. 20–Nov. 14
Collinsville	Sept. 13–Sept. 19	June 2–Nov. 25	July 1–Dec. 7	Aug. 26–Nov. 30	June 24–Nov. 28	May 28– *
Emmaton	Sept. 14–Sept. 19	June 4–Oct. 6	Aug. 6–Sept. 13	Sept. 20–Nov. 16	June 24–Oct. 6	June 14– *
Freeport						Aug. 16–Oct. 6
Grand Island Bridge						Aug. 6–Oct. 30
Hood Ferry						Aug. 10–Oct. 28
Holland Pump						July 26– *
Howard Ferry						July 30–Oct. 26
Island Home		Aug. 14–Sept. 29				
Isleton		Aug. 14–Sept. 28				July 2–Nov. 20
Jersey	Sept. 13–Sept. 18	June 2–Dec. 14	Aug. 6–Oct. 31	Sept. 16–Nov. 16	June 28–Nov. 20	May 22–Nov. 14
Jones Landing		Aug. 27–Sept. 28				
Junction of North Fork and South Fork of Mokelumne River		Aug. 26–Nov. 19				
King Island—Camp 3½						Aug. 12– *
Liberty Ferry						Aug. 4–Nov. 14
Lincoln Highway San Joaquin River						Sept. 8– *
Little Holland Ferry						Aug. 10–Oct. 2
Mansion House—Victoria Island						Aug. 6– *
McDonald Pump		July 23–Nov. 19				
Medford Island Pump						July 18–Nov. 20
Middle River						Aug. 8– *
New Hope Bridge		Aug. 26–Nov. 19				
North Fork Pump		Sept. 18–Oct. 9				
Oakland and Antioch Bridge		June 16–Nov. 19	July 1–Dec. 31	Sept. 8–Dec. 14	June 24–Nov. 30	
Oakland and Antioch Ferry		June 2–Dec. 2	July 1–Dec. 30	Sept. 6–Dec. 14	June 24–Nov. 30	May 24– *
Orwood Pump		July 22–Nov. 24				
Quimby Pump		July 23–Nov. 24				
Ridge Pump						Aug. 8– *
Rio Vista	Sept. 13–Sept. 19	July 23–Oct. 9		Sept. 22–Oct. 16	Aug. 22–Nov. 16	June 16–Nov. 20
Ryer Island Ferry		Aug. 16–Sept. 28				
Sacramento		Sept. 27–				
Sing Kee Landing		Oct. 9–Oct. 15				
Sherman Island Ferry		June 2–Sept. 30	Aug. 6–Oct. 31			
Sutter Slough						July 26–Oct. 30
Terminous		Sept. 18–Nov. 19				
Three-Mile Ferry		June 2–Oct. 31	Aug. 7–Oct. 27		July 2–Oct. 30	June 14– *
Tyler Island Ferry		Aug. 14–Oct. 30				July 30–Oct. 14
Venice		July 23–Nov. 13				
Wakefield Landing		Aug. 7–				Aug. 18– *
Walker Landing		Sept. 15–Oct. 6				
Walnut Grove		Aug. 14–Nov. 1				July 18–Oct. 24
Webb Pump		July 23–Dec. 13				July 16–Nov. 18
Williams Bridge						Aug. 20–Oct. 20
Zuckerman Pump		July 25–Dec. 3				

*Observation season not closed.

Plate 9-5

CURVES SHOWING VARIATION OF SALINITY WITH TIDE

Stafford Report, 1924



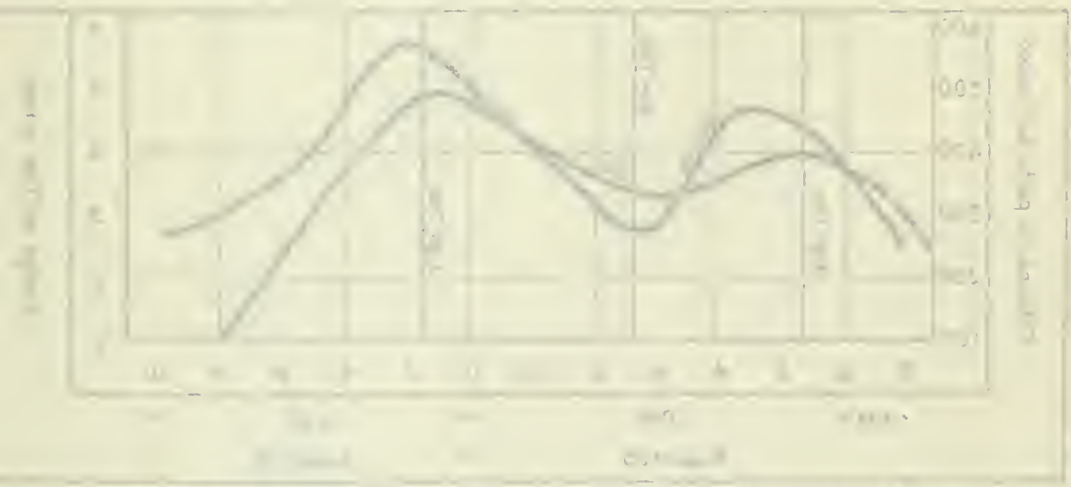
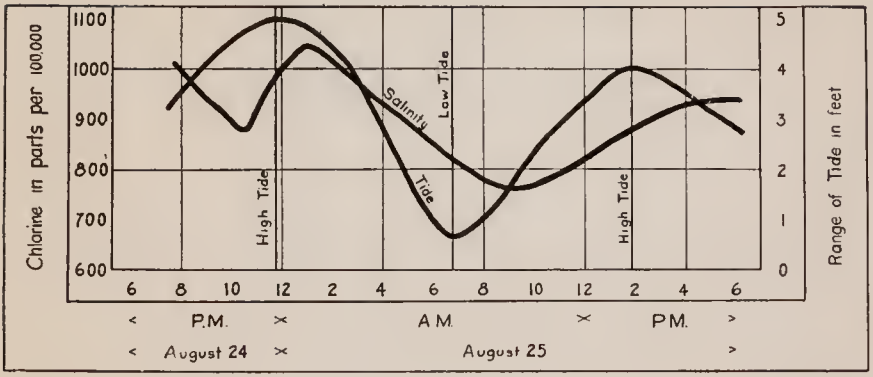
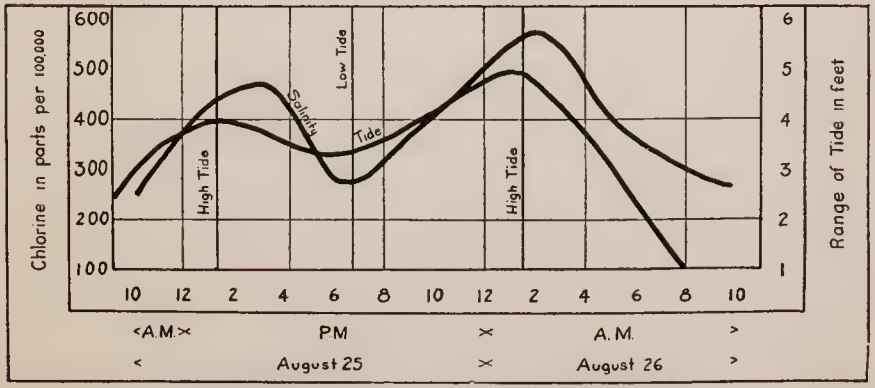


PLATE 9-5

ANTIOCH—AUGUST 24 AND 25



RIO VISTA—AUGUST 25 AND 26

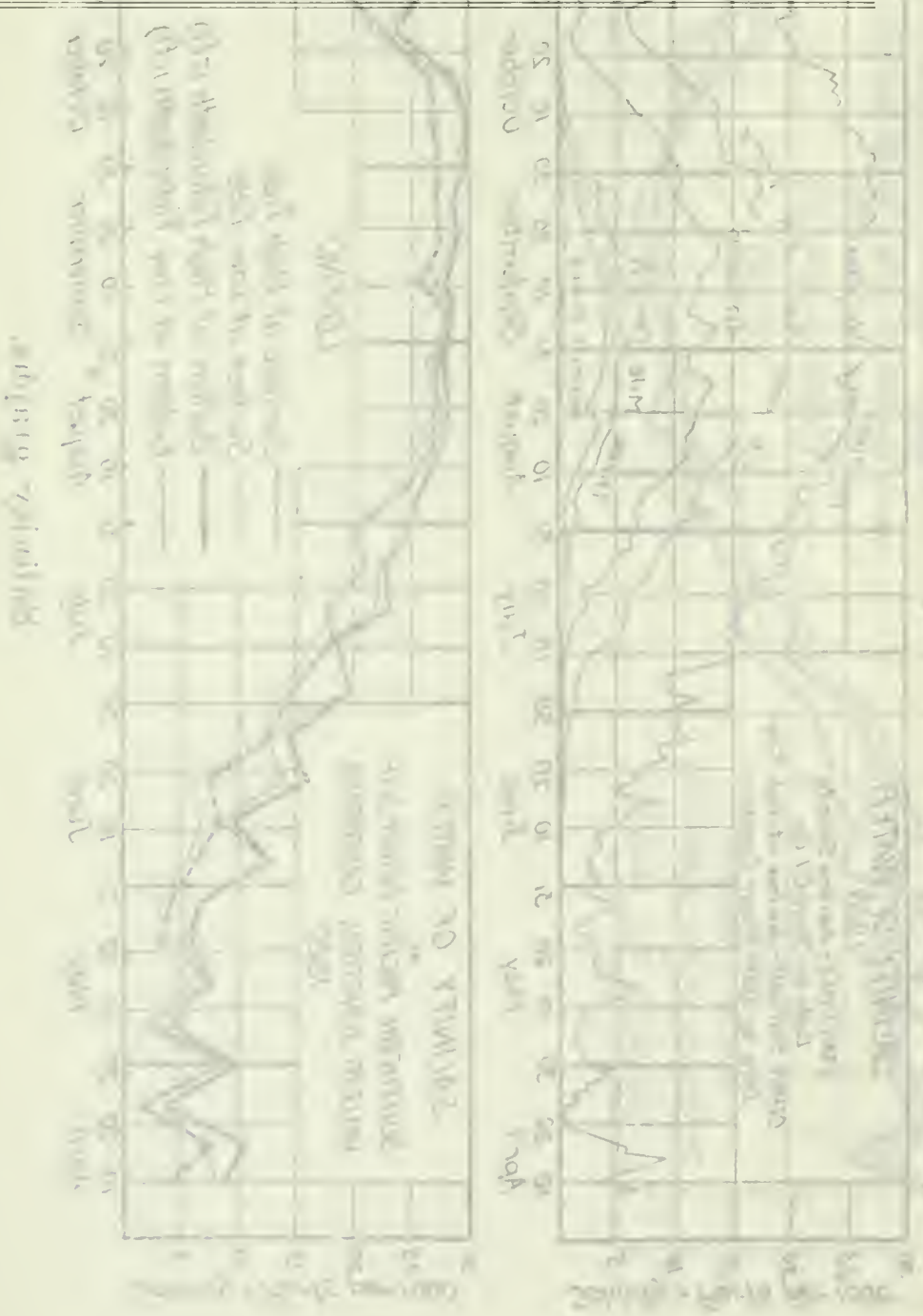


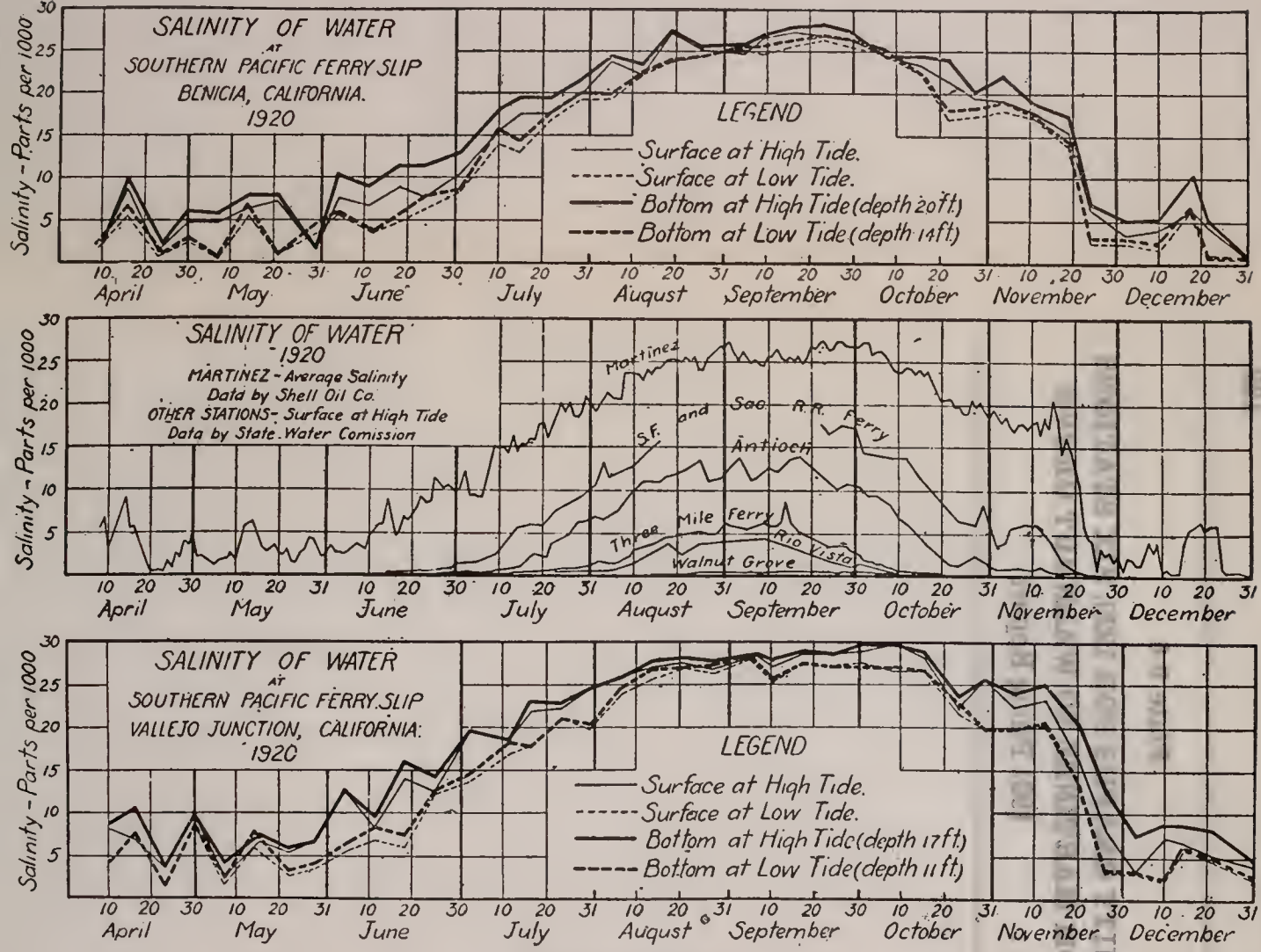
VARIATION OF SALINITY WITH TIDE, AUGUST, 1924

Plate 9-6

SALINITY GRAPHS FOR 1920, SIX STATIONS FROM MARTINEZ TO WALNNUT GROVE

1921 Piling Report




SALINITY OF WATER
AT
SOUTHERN PACIFIC FERRY SLIP
BENICIA, CALIFORNIA.
1920
LEGEND
Surface at High Tide.
Surface at Low Tide.
Bottom at High Tide (depth 20 ft.)
Bottom at Low Tide (depth 14 ft)
Salinity - Parts per 1000
30
25
20
15
10
5
10 20 30 10 20 31 10 20 30 10 20 31 10 20 31 10 20 30 10 20 31 10 20 30 10 20 31
April May June July August September October November December
SALINITY OF WATER
1920
MARTINEZ - Average Salinity
Data by Shell Oil Co.
OTHER STATIONS - Surface at High Tide
Data by State Water Comission
Martinez
S.F. and Sac. R.R. Ferry
Antioch
Three Mile Ferry
Rio Vista
Walnut Grove
Salinity - Parts per 1000
10 20 30 10 20 31 10 20 30 10 20 31 10 20 31 10 20 30 10 20 31 10 20 30 10 20 31
April May June July August September October November December
SALINITY OF WATER
AT
SOUTHERN PACIFIC FERRY SLIP
VALLEJO JUNCTION, CALIFORNIA.
1920
LEGEND
Surface at High Tide.
Surface at Low Tide.
Bottom at High Tide (depth 17 ft.)
Bottom at Low Tide (depth 11 ft.)
Salinity - Parts per 1000
10 20 30 10 20 31 10 20 30 10 20 31 10 20 31 10 20 30 10 20 31 10 20 30 10 20 31
April May June July August September October November December

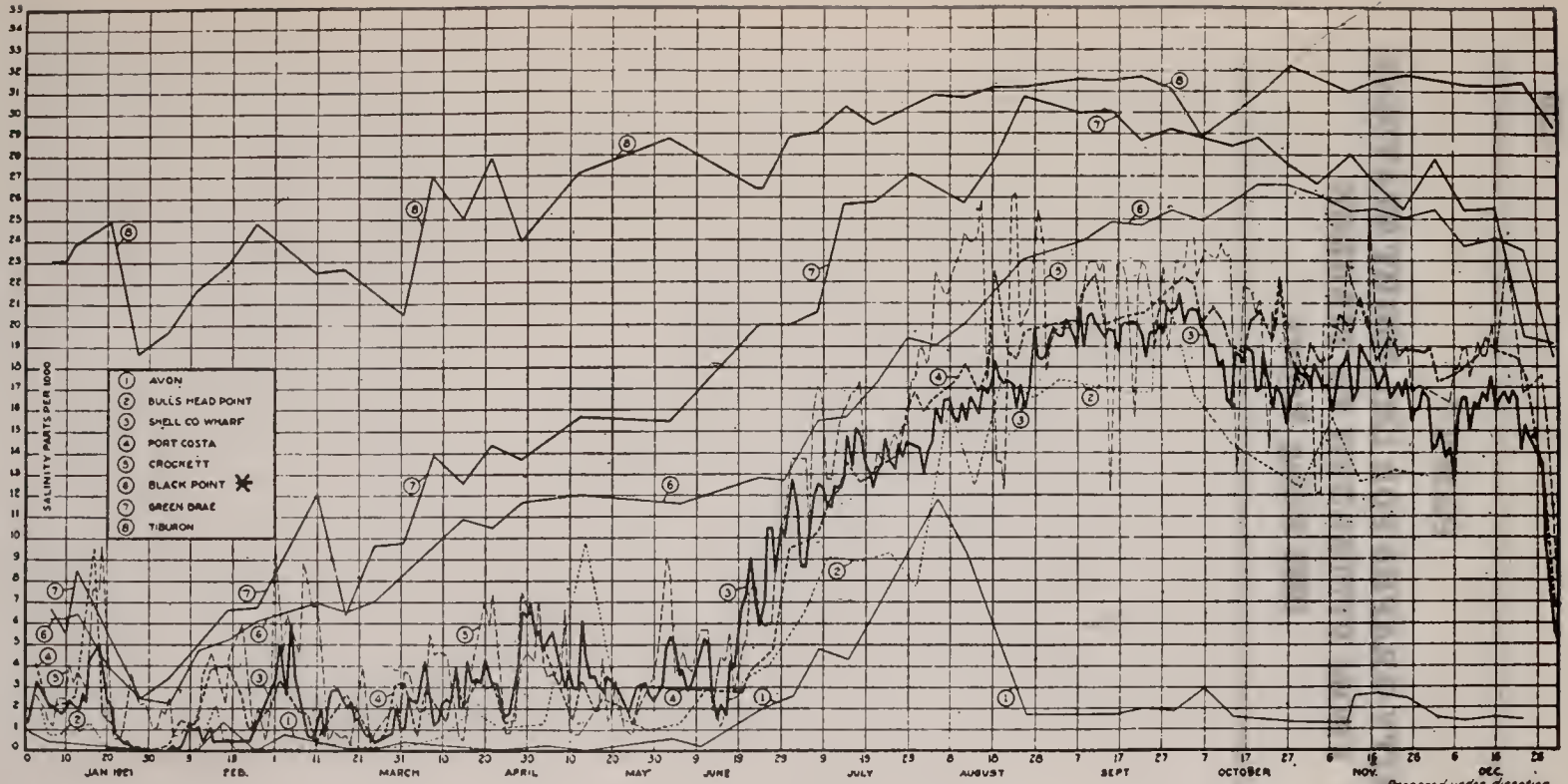
Salinity graphs.

PLATE 9-6

Plate 9-7

SALINITY GRAPHS FOR 1921, EIGHT STATIONS FROM PITTSBURG TO TIBURON

1922 Piling Report



SALINITIES IN S.F. BAY - 1921

* Now Pittsburg.

PLATE 9-7

Plate 9-8

SALINITY CURVES, RELATION BETWEEN RIVER DISCHARGE AND BAY SALINITY

Sheet 1 of 2

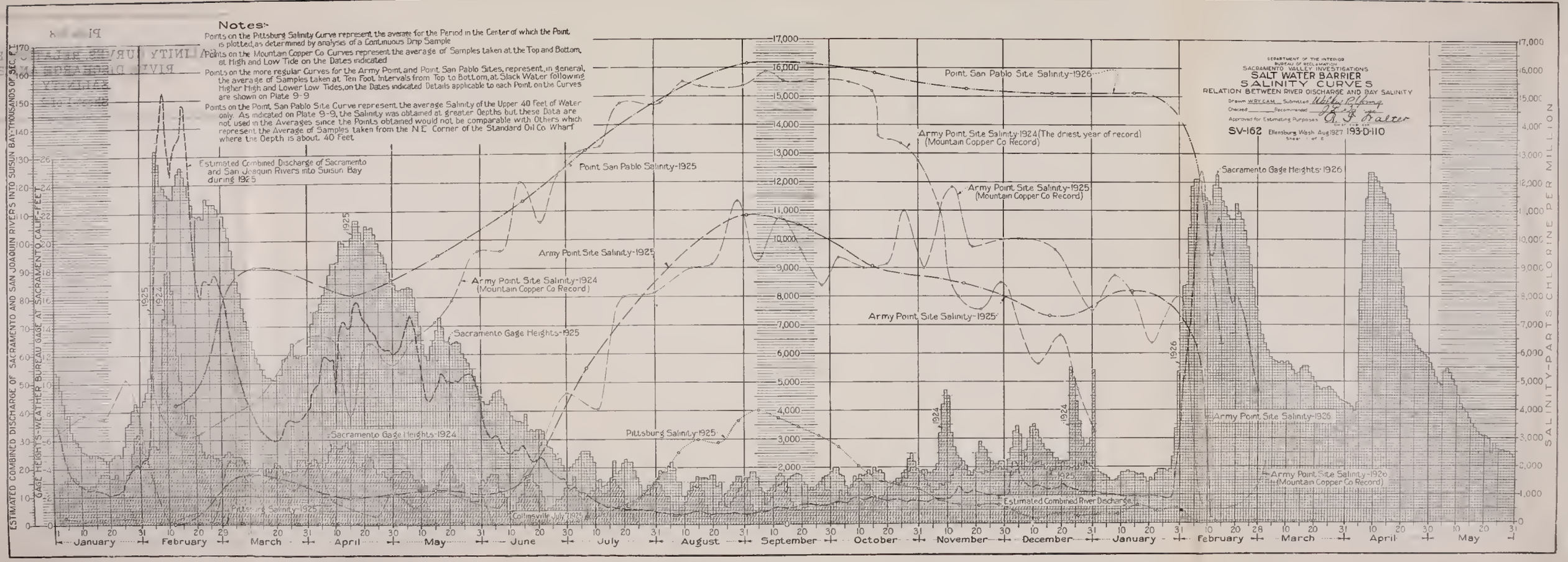
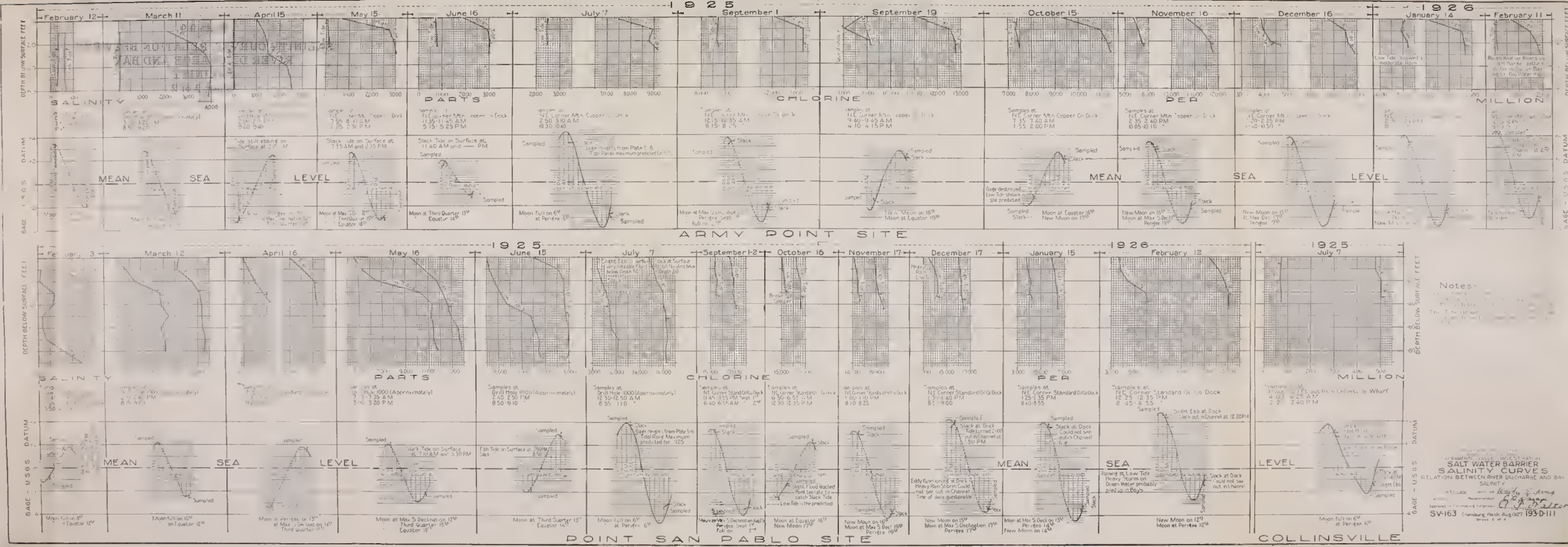

Notes:-
Points on the Pittsburg Salinity Curve represent the average for the Period in the Center of which the Point is plotted, as determined by analysis of a Continuous Drip Sample
Points on the Mountain Copper Co Curves represent the average of Samples taken at the Top and Bottom, at High and Low Tide on the Dates indicated
Points on the more regular Curves for the Army Point and Point San Pablo Sites, represent, in general, the average of Samples taken at Ten Foot Intervals from Top to Bottom, at Slack Water following Higher High and Lower Low Tides, on the Dates indicated Details applicable to each Point on the Curves are shown on Plate 9-9
Points on the Point San Pablo Site Curve represent the average Salinity of the Upper 40 Feet of Water only. As indicated on Plate 9-9, the Salinity was obtained at greater Depths but these Data are not used in the Averages since the Points obtained would not be comparable with Others which represent the Average of Samples taken from the N.E. Corner of the Standard Oil Co. Wharf where the Depth is about 40 Feet
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS
SALT WATER BARRIER
SALINITY CURVES
RELATION BETWEEN RIVER DISCHARGE AND BAY SALINITY
Drawn WBY.CAM. Submitted Wesley R. Young
Checked Recommended
Approved for Estimating Purposes R. F. Walter
Chief, C.O.& E.M.
SV-162 Ellensburg Wash. Aug 1927 193-D-110
Sheet 1 of 6
Estimated Combined Discharge of Sacramento and San Joaquin Rivers into Suisun Bay during 1925
Point San Pablo Salinity-1925
Point San Pablo Site Salinity-1926
Army Point Site Salinity-1924 (The driest year of record) (Mountain Copper Co Record)
Army Point Site Salinity-1925 (Mountain Copper Co Record)
Army Point Site Salinity-1925
Army Point Site Salinity-1924 (Mountain Copper Co Record)
Sacramento Gage Heights-1925
Sacramento Gage Heights-1926
Sacramento Gage Heights-1924
Army Point Site Salinity-1926
Pittsburg Salinity-1925
Army Point Site Salinity-1926 (Mountain Copper Co Record)
Pittsburg Salinity-1925
Estimated Combined River Discharge
Collinsville July 1925
ESTIMATED COMBINED DISCHARGE OF SACRAMENTO AND SAN JOAQUIN RIVERS INTO SUISUN BAY-THOUSANDS OF SEC. FT.
GAGE HEIGHTS-WEATHER BUREAU GAGE AT SACRAMENTO, CALIF.-FEET
SALINITY-PARTS CHLORINE PER MILLION
January February March April May June July August September October November December January February March April May

Plate 9-9

SALINITY CURVES, RELATION BETWEEN RIVER DISCHARGE AND BAY SALINITY

Sheet 2 of 2


1925
1926
February 12
March 11
April 15
May 15
June 16
July 17
September 1
September 19
October 15
November 16
December 16
January 14
February 11
SALINITY
PARTS
CHLORINE
PER
MILLION
DEPTH BELOW SURFACE FEET
MEAN SEA LEVEL
GAGE - U.S.G.S. DATUM
ARMY POINT SITE
February 3
March 12
April 16
May 16
June 15
July 7
September 1-2
October 16
November 17
December 17
January 15
February 12
July 7
POINT SAN PABLO SITE
COLLINSVILLE
Notes-
SALT WATER BARRIER
SALINITY CURVES
IN RELATION BETWEEN RIVER DISCHARGE AND BAY SALINITY
SV-163

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